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The Truth About Baking Powder

*from Records in
Docket No. 540*

*Federal Trade Commission
Washington, D. C.*

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Calumet Baking Powder
Company. #1282869
The truth about baking
powder

powder

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The Truth About

Baking Powder



Including
Government Standard
for Baking Powder and
Government Exhibits



Compiled and Distributed by
CALUMET BAKING POWDER COMPANY
Chicago, Illinois, U. S. A.

Printed in United States of America
February, 1928

Sworn Testimony [[VERBATIM EXCERPTS]]

NOT HERETOFORE PUBLISHED

of Well Known Scientists and Baking
Powder Experts at Hearings Conducted

by the

FEDERAL TRADE COMMISSION,
Washington, D. C.



*Sworn Scientific Testimony from
Records in Docket No. 540*

FEDERAL TRADE COMMISSION

vs.

ROYAL BAKING POWDER CO.

Including Preface by

CALUMET BAKING POWDER COMPANY

Chicago, Illinois

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Official Government Standard for Baking Powder

COPY

UNITED STATES DEPARTMENT OF AGRICULTURE

OFFICE OF THE SECRETARY
WASHINGTON, D. C.

FOOD INSPECTION DECISION No. 174

BAKING POWDER

The following definition and standard for baking powder was adopted by the Joint Committee on Definitions and Standards, November 18, 1916, and was approved by the Executive Committee of the Association of American Dairy, Food and Drug Officials for the Association of American Dairy, Food and Drug Officials, April 2, 1917, and by the Association of Official Agricultural Chemists, November 22, 1916.

Baking powder is the leavening agent produced by the mixing of an acid reacting material* and sodium bicarbonate, with or without starch or flour.

It yields not less than twelve per cent (12%) of available carbon dioxide.

The acid reacting materials in baking powder are: (1) Tartaric acid or its acid salts, (2) Acid salts of phosphoric acid, (3) Compounds of aluminum, or (4) Any combination in substantial proportions of the foregoing.

*The announcement of the amount of calcium sulphate which reacts as an acid reacting material in baking powder is reserved pending further investigation.

The announcement of the amount of other salts of phosphoric acid which react in baking powder is reserved pending further investigation.

Baking powder materials should be as free from metallic impurities as it is feasible for a manufacturer to make them. The announcement of the limits for arsenic, lead, zinc and fluorids is reserved pending further investigation.

The foregoing definition and standard is adopted as a guide for the Officials of this department in enforcing the Food and Drug Acts.

D. F. HOUSTON,
Secretary of Agriculture.

WASHINGTON, D. C., February 26, 1918.

Preface

FIFTY years ago the Royal Baking Powder Company found itself faced with the competition of baking powder selling for about one-half the price of Royal, and decided to begin a war against these competing powders, to prevent their sale by discrediting them in every way possible, even to the extent of charging them with being poisonous and deleterious to health.

Here is the story told by the heads of Royal Baking Powder Co. themselves. It clearly shows their cunning—and is well worth reading:

Copy of testimony of Wm. Ziegler, Sr., and his partner Hoagland. Government citation—pages 188 to 192 of Records in Docket No. 540. Federal Trade Commission (Created by Act of Congress, Sept. 26, 1914) vs. Royal Baking Powder Co.

(Mr. Ziegler's testimony)

"I have heard the testimony about what is called the 'alum war;' I instituted it on the part of the company; I heard the testimony that Dr. Mott was employed and that he in turn employed other assistant chemists to analyze and make certain experiments; I employed Dr. Mott personally; it is possible that Mr. Hoagland may have made the money arrangement with him; I went and saw him and made the arrangements for him to conduct these experiments for us; I also visited other chemists and got certificates; I did that, all that business connected with the chemical part of the investigations; prepared the matter; I originated that matter; Mr. Joseph C. Hoagland bitterly opposed it; he said war on alum would injure the sale of all baking powders; that it would bring all baking powders into disrepute, as it was difficult for the public to tell an alum baking powder from a cream of tartar baking powder; we had also as a company been manufacturing alum baking powder which was in the market not under our brand as Royal but another brand; the theory was that some of our competitors might get hold of some of that, analyze it and show that we also manufactured alum baking powder; this discussion was kept up for over a year between the officers and the trustees of



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the company and myself; I was on the alum side, for the alum war as you termed it; I was in favor of doing the advertising and making the war; that was finally adopted; it was Dr. Mott who prepared this alum pamphlet; he prepared all the material for it; I think he wrote it all, in fact I know he did or Mr. Ross; that alum business was as far back as 1876 or 1877."

‡Mr. Brownell: I read from Mr. Hoagland's testimony, beginning on page 53:

"In 1876 our profits were less than they were in previous years; in this year we were face to face with the most serious problem that we ever encountered; the fact was that the sales were that year less than previous years; the fact was that alum baking powder is composed of a substance costing three cents a pound; alum, instead of cream of tartar, costing thirty cents a pound, was being substituted for cream of tartar; we were compelled to determine whether we should use that substance or show that substance to be an unwholesome one; we found that putting up show cards and circulars have not built up this business to a large extent, but have left us with this new competition with decreased sales; we were compelled to determine what we should do with reference to the alum baking powder; we proceeded to investigate the baking powders upon the market, and found that a large number composed wholly of alum and a mixture of flour; we found one or two that were formerly supposed to be cream of tartar powder and advertised as such containing a proportion of alum; we then had an investigation, sent a man to the Astor Library, had an investigation as to the unwholesomeness of this material; sent a man to the Astor Library to obtain all the evidence he could on the 'subject of alum;' we had that investigation in pamphlet form; we had a chemical analysis of the baking powders made; we made them and had them made by others; then we got the opinion of the Board of Health and scientific men as to the question whether alum is wholesome or not; having obtained that evidence we published the names of all the alum baking powders in the market."

Mr. Brownell: Now I will go to page 55:

"I had charge of the work as legitimately coming under the advertising department, as a matter of fact, I had charge of it; I received assistance from my associates; during this time we began to advertise in the newspapers more extensively than we did before making these investigations

‡Attorney for Federal Trade Commission.

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on the subject of the wholesomeness of baking powder as a ground work for our advertisements; I wrote these advertisements, except in so far as we had obtained them in the way of certificates from chemists; they were incorporated in the advertisements by me; we engaged with the newspapers direct so as to get a reading notice under the regular heading of the papers; I would write these reading notices, and they were put in the papers as reading notices; that was one method; there were others; besides that we distributed these pamphlets; we employed all sorts of methods in showing up the use 'of alum and its unwholesomeness;' we were showing this alum up as a deleterious substance; we hardly stopped that year; we pressed it very vigorously for two or three years."

As shown by the sworn testimony of the heads of the Royal Baking Powder, their company had systematically initiated a campaign of defamation of competitors' baking powders, claiming that they were poisonous and deleterious to health and that they contained alum, etc.

This system included a widespread newspaper campaign with stereotyped statements that were intended to confuse the baking powder ingredient, sodium aluminum sulphate (S. A. S.), with alum—potassium or ammonium salt as is sold only in drug stores.

Baking powders do not contain alum. The ingredient Royal has deliberately confused with drug store alum is chemically and commonly known as sodium aluminum sulphate (S. A. S.). It would be illegal under the Food and Drug Acts to sell Sodium Aluminum Sulphate as alum, as it is not alum. Courts in Pennsylvania have held that the substance, Sodium Aluminum Sulphate (S. A. S.), in baking powder is not alum. So there for the first time the **truth** was brought out so clearly that anyone can understand. Read the following:

THE TRUTH ABOUT BAKING POWDER

DECISION IN PENNSYLVANIA
BAKING POWDER CASE

By Honorable Allison O. Smith,
P. J. 46th Judicial District

COMMONWEALTH *vs.* MEYER GROSS

In the Court of Quarter Sessions of Dauphin County
No. 61, January Sessions, 1910

"Sur Motion in arrest of judgment and for new trial.

OPINION

By Honorable Allison O. Smith, Presiding Judge, 46th Judicial District, specially presiding.

"1. That all of the expert witnesses on both sides concede that alum as commonly known in the United States, to the non-scientific at least, is potassium aluminium sulphate in its crystalline form.

"2. That practically all of the definitions given for the word 'alum,' singular, in scientific works as well as in dictionaries, speak of potassium aluminium sulphate with the water of crystallization as the common alum of commerce and trade, and when it is intended to refer to other double or single sulphates of aluminium use the qualifying word necessary to express the class or kind. Professor G. G. Pond, of State College, compiled and used in his testimony, definitions obtained from 169 sources or authorities, general, medical and scientific, and from works in at least three different languages. It is clear from a study of this compendium of authority compiled by Professor Pond, that the weight of the written authority is to the effect that the word 'alum' has a distinctive meaning in its common acceptance, that is that it is the ordinary potassium alum. A fair sample of the prevailing written authority on the subject appears in Webster's New International Dictionary. Under the head of alum, it is defined: '1. Sulphate of potassium and aluminium, $KAl (SO_4)_2 \cdot 12H_2O$ crystallizing ordinarily in beautiful

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colorless octahedrons;—called specif. potash alum, or potassium alum. It has an astringent taste. Alum has various uses in the arts, and is employed in medicine especially as a styptic and astringent. 2. Chem. Any of a series of double sulphates isomorphous with common alum, in which the potassium may be replaced by sodium, ammonium, etc., and the aluminium by iron, chromium or some other trivalent metal. Ammonium aluminium sulphate, or ammonia alum, very closely resembles potassium alum, and is often sold as alum.' It is clear that this authority recognizes that the alum of common parlance is a well known and specific substance, and that this substance is potassium aluminium sulphate in crystalline form. It is also clear from the definition given in some of the authorities, that a large number of substances are designated by the general name of alums. There also are double sulphates in which aluminium may be replaced by iron, chromium or manganese, and also in which the potassium may be replaced by some other alkali or ammonium. The general name of alums, therefore, it seems to us, would have a much wider meaning and include a much greater number of substances than was contended for by the expert chemical witnesses of the Commonwealth. As above stated, they limited the word 'alum' to the double salts of aluminium produced by potassium, sodium and ammonium and a single aluminium sulphate. We fail to find text book authority for limiting the definition of alums, in the plural, to the four combinations named. If the word 'alum,' in the singular, had a wider significance than that of its common use, we fail to understand why it does not include all of the various substances which have come to be considered in the general class. Such a definition appears in the Century Dictionary under head of alum: 'The general name of a class of double sulphates formed by the union of aluminium, iron, chromium or manganese sulphate with the sulphate of some other metal, commonly an alkaline metal or ammonium. Common or potash alum has the formula $\text{Al}_2(\text{SO}_4)_3$ plus K_2SO_4 plus $24 \text{H}_2\text{O}$.'

"3. The context of the word 'alum' in the fifth paragraph of Section 3, is a strong argument against the contention of the Commonwealth. On cross-examination, it was pretty

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generally conceded by the expert chemists of the Commonwealth that each of the prohibited substances named in the singular number, in the clause which includes the word 'alum,' refers to a definite and distinct substance, and that a plural noun was used to indicate substances of like nature or compounds containing the prohibited substance in the singular. For instance, in the immediate context that Act says: 'boric acid or borates, salicylic acid or salicylates, formaldehyde, hydrofluoric acid or fluorides, fluoborates, fluosilicates, or other fluorine compounds, dulcin, glucin, saccharin, alum, compounds of copper, betanaphthol, abrastol, asaprol, oxides of nitrogen, nitrous acid or nitrates, pyroligneous acid or other added ingredients deleterious to health,' etc. The testimony of all of the experts would seem to indicate that in no other instance could there arise such a dispute as has arisen in this case over the word 'alum.' It is clear, not only from the testimony offered but from the written authority of dictionaries and chemistries, that there is a well founded difference of opinion as to the word 'alum' and just what substance the said word does include. The author of this Act must have drawn it with a chemist at his elbow, for it indicates a fluent use of chemicals and compounds. If in all other substances the words used indicate a definite and distinct substance, it is a persuasive argument to say that the word 'alum' also must have designated a definite and distinct substance. This is especially true in view of the fact that the author of this Act could have so easily removed all doubt as to what was meant. In this case, it appears from the practically uncontradicted evidence, and the jury have so found, that the substance in the baking-powder in question is a mixture or compound of sodium sulphate and aluminium sulphate anhydrous, that is, without the water of crystallization. This substance is known to the chemical trade, according to evidence in the cause, as S. A. S., meaning sodium aluminium sulphate. Had the Legislature intended the construction contended for by the Commonwealth, it certainly would have been easy to have used words clearly covering the points which it now attempts to include. Had the word been used in the plural even, much less doubt as to what was meant could have arisen. The use of the word aluminium sulphates would clearly have

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covered the substance here used. We conclude, therefore, that the context of the Act sustains the contention of the defendant."

Sodium Aluminum Sulphate (S. A. S.) the baking powder ingredient, is never used in medicine, never prescribed by physicians, and is not known as a drug.

In taking advantage of the lack of information of the average housewife with regard to chemical terminology and their natural prejudice against the use of drug substances as ingredients in food, the Royal Baking Powder Company continued their attacks against competitive products in a vain effort to justify the exorbitant price which they were obtaining for their product. These attacks not only condemned the use of sodium aluminum sulphate (S. A. S.), but phosphate as well. For more than thirty years the country was flooded with statements condemning baking powders made with phosphate along with those made with sodium aluminum sulphate, as "mineral poisons."

Their bad faith all along is shown by the following facts:

FOR MANY YEARS, and simultaneously with their campaign of defamation and vilification selfishly practiced in order to obtain a high price for their Cream of Tartar goods, the Royal Baking Powder Company was secretly interested in the manufacture and sale of the very class of goods that they were condemning and were enjoying dividends therefrom. In fact, while condemning phosphate baking powders as unfit for consumption, claiming that such acid was made from burned bones, etc., they at this same time were the owners of 49 per cent of the stock of the Provident Chemical Works of St. Louis, Mo., which

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manufactured and sold phosphate to various baking powder firms, including the Calumet Baking Powder Company, whose product Royal Baking Powder Company was ever ready to condemn.

TODAY, the Royal Company is manufacturing and selling a phosphate type of powder such as they condemned and classed as a mineral poison a few years ago.

For many years Wm. Ziegler, Sr., the head of the Royal Baking Powder Company was the chief owner of the Southern Manufacturing Company, of Richmond, Virginia, which was at that time the largest manufacturer of the so-called "alum" baking powder, in the United States. So, it is beyond contradiction that while with one hand they were warning the public against the use of phosphates and "alum" so-called, with the other hand they were "raking in the shekels" from the sale of these same substances.

About 1914, as a result of scandals involving the Royal Baking Powder Company's methods, in connection with their conduct of the so-called baking powder war, newspapers began to refuse the derogatory copy, so that Royal was forced to resort to house-to-house canvasses, repeating by word of mouth, the defamation no longer acceptable to honest publishers. Similar disparagement was continued through the use of circulars, cook books, etc. Practically every page of a Royal cook book carried some short statement intended to poison the public mind against the cheaper priced competing powders.

The baking powder war between the Royal and the independent manufacturers reached such proportions that the Government stepped in. President Roosevelt appointed a Referee Board to decide scientific questions for the U. S. Government, among which was the baking powder controversy. Everyone knows the

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result. The Referee Board, often referred to as the Supreme Court of Science, found that the so-called "alum" baking powders were no more injurious than the phosphate, cream of tartar, or any other type. Thus ending a controversy of thirty years' standing.

"In short, the board conclude that alum baking powders are no more harmful than any other baking powders."

But, while the controversy was ended so far as the question of public interest was concerned and though no one, including the Royal, dared question or appeal the decision of the Referee Board, still the Royal Baking Powder Company continues its insidious attacks upon all types of baking powders save its own.

In 1916 the Joint Committee on Definitions and Standards on Food, after conducting hearings, established a standard for baking powder as follows:

"Baking powder is the leavening agent produced by the mixing of an acid reacting material—and sodium bicarbonate, with or without starch or flour.

"It yields not less than twelve per cent (12%) of available carbon dioxide.

"The acid reacting materials in baking powder are: (1) Tartaric acid or its acid salts, (2) Acid salts of phosphoric acid, (3) Compounds of aluminum, or (4) Any combination in substantial proportions of the foregoing."

thus confirming the findings of the Referee Board.

In the meanwhile, the Great War came along; the price of Cream of Tartar became much higher, so the Royal Baking Powder Company, practically overnight, changed the type of one of the brands that they were manufacturing, namely the Dr. Price Cream Baking Powder (made in Chicago), from a cream of

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tartar type to a phosphate type. In doing this they attempted to retain the same name and simulate the former label. Here again they clashed with the food authorities far and wide. The Federal Trade Commission entered a complaint against them known as Docket No. 539. Action was brought against them in several states, including the U. S. Courts. Again Royal was convicted of deceiving the public and acting in bad faith.

Royal appealed the decisions of the United States District Court of Arkansas, and also the findings of the Federal Trade Commission, but both decisions against Royal were upheld. Once more they were convicted of dishonest practices and in sustaining the Commission's decision against Royal, the court said in part:

"The purpose of the Congress in creating the Federal Trade Commission was aimed at just such dishonest practices, and business concerns who resort to dishonest devices of this nature must understand that they cannot add to their revenue or maintain their business standing by methods of competition which the law brands as 'unfair' and therefore unlawful. The order of the Commission is affirmed."

So, the Court record shows that Royal stands convicted in Docket No. 539, a sister complaint to No. 540, now pending.

The present case (No. 540) charges the Royal Baking Powder Company with disparagement of competitive goods. Their defense is further proof that they are not interested in public health as claimed, but are merely spreading selfish propaganda to justify the exorbitant price charged for Royal Baking Powder.

Another interesting Royal exposé can be found in

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the records of the Missouri Legislature. There again the cloak of "public interest" was used under the guise of a health association. A bill prohibiting the manufacture and the sale of (so-called) alum baking powder was passed.

Daniel J. Kelly, a Royal agent, organized a fake movement—"The National Health Society"—to conduct a campaign against (so-called) "alum" baking powders, to furnish "cover" for Royal, and to make it appear to be a philanthropic movement, solely in the interest of public health.

Kelly and ‡Ziegler were both indicted for bribery in Missouri. Kelly fled the country and is still residing abroad. Ziegler successfully resisted extradition to Missouri for trial and died with this indictment unanswered.

As you will find from the sworn testimony to follow, Royal stockholders made large profits by the sale of the very baking powder it condemned as poisonous. It is said their dividends on the sale of the so-called alum powders ran as high as 140 per cent over one year.

Compare the sworn testimony of these unbiased, disinterested witnesses for the Government, hitherto unpublished, with the statements of the experts employed by Royal to testify in their behalf.

In the whole fifty years the Royal Company has dared nothing half so desperate as their attempt to render a favorable verdict in their own behalf in this case, by mailing out hundreds of thousands of pamphlets during the fall of 1926 (while the case against them was still pending), cleverly arranged so as to further mislead the public as to the facts and even assuming an injured innocence and pretending that the

‡Late Wm. Ziegler, Sr., Active Head of Royal Baking Powder Co.

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question of alum in baking powder had been passed upon and that their company had been absolved from all guilt. While in fact the record shows that the question of alum in baking powder was never considered by the Federal Trade Commission and that the Royal Baking Powder Company knew that the question was not considered by the Commission; and that the case was still pending and that no Findings of Fact had been made, nor had any been accepted by the Commission, at the time they distributed the pamphlet including a questionnaire of their own compilation and a Trial Examiner's report upon the facts, which had not been accepted by the Commission.

Excerpts from hearing

BEFORE THE FEDERAL TRADE COMMISSION

Federal Trade Commission *vs.* **Royal Baking Powder Co.**
Docket No. 540

ORAL ARGUMENTS OF COUNSEL

Washington, D. C.
April 5, 1926

On motion of Attorney Brownell to vacate Order of
Dismissal and direct rehearing of case.

** "THE CHAIRMAN. Is there anything in this record proving that the unfair practices complained of here have continued since 1922:

†† 'MR. COX. No. The last case of any of these canvasser things is November 1922. I think I am right in stating that. Most of them were back in 1906 and 1910.

‡‡ 'COMMISSIONER HUMPHREY. Is there any evidence the other way, that they have been discontinued, or is the record silent on that:

'MR. COX. I think it is silent. The way it was done, we

**Senator Nugent, Chairman Federal Trade Commission.

††Attorney for Royal Baking Powder Company.

‡‡Member Federal Trade Commission.

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turned over what they wanted, and we stipulated that was our advertising and that fairly shows that up to 1914 on several things, and after that substantially all, with the exception of 'no alum, no bitter taste,' I think it is silent on that.

'COMMISSIONER HUMPHREY. And what the Commission would have to do on that point, is that they would have to take the evidence and draw their own conclusions as to whether or not it has been discontinued, or whether there is a probability of no discontinuance. There is no positive evidence on that question, one way or the other.

'MR. COX. Not as I recall it.

§ 'COMMISSIONER VAN FLEET. The Commission, in passing on this case, did not render any decision whether alum baking powder was harmful or not. That point was not argued. All these things we have had to go over again today were not argued. Seemingly, they were not thought of enough importance to bring to the attention of the Commission the last time. **Consequently, we went ahead and decided the case on the one question, whether the Commission could forbid you from saying on your cans that it did not contain alum.** It was the opinion of a majority of the Commission that you could not be prohibited from doing that, any more than a man making an all wool blanket could be prevented from saying that it contained no shoddy. **That is all that was decided.** Then, comes the attorney for the Commission and says 'but there are a lot of things you have been doing in the past, that are way beyond reason and as long as the thing is not absolutely settled and that there are opinions on both sides, it is a serious question whether in that state of affairs it would be a fair thing for you to keep up these statements.'

'I am not expressing my opinion on it, but I would at least say that I have grave doubts as to whether you would be warranted in doing these things. Therefore, when the attorney for the Commission alleges in his motion that you are doing those things right down to date, when he made that allegation, I voted then to have this hearing. That is what I supposed we were to hear, the allegations in this motion. That is what I want to know, whether that is so or not.

'MR. COX. Well, I was a little puzzled myself because all this matter was in the Commission's brief on the hearing and I did not know just what the motion did represent. I

§Member Federal Trade Commission.

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would be glad, as I have said, to hand up a statement of just what the evidence shows as to these specific things.

'COMMISSIONER VAN FLEET. There has been no evidence presented here, as I understand it, that you are continuing them down to date, and the burden is on the Commission to sustain that allegation in the motion. I wanted also to get it clear that the action of the majority of the Commission in dismissing the case was not a decision to the effect that in view of the state of affairs, the dispute about whether alum is deleterious or not, it was not a decision that it is deleterious and not a decision that you would have a right to make all the statements that have been alleged against you because we simply passed on the one point.

'MR. COX. I assumed that the Commission did not decide anything with regard to alum one way or the other.

'COMMISSIONER VAN FLEET. We did not. We decided the one question that was argued before us, and that is all that was presented to us. Ordinarily, in a procedure before courts, if a party does not present something, he is not entitled to raise a point on the motion for rehearing. But he did say in this case, and I suppose the only thing was the hearing on the allegation in the motion that you had kept these things up and if the record shows that you were now going around telling people that it is the same as eating ground up aluminum pans, we would have another question to decide here, and I am not saying that I would not decide in favor of an order under those circumstances."

So, the purpose of this compilation is to give the true facts and to correct the one-sided exhibit sent out by the Royal Baking Powder Company, by reproducing verbatim (either excerpts or in whole), the testimony of disinterested, unbiased witnesses, and statements of scientists and expert chemists who were called as witnesses for the U. S. Government, so that the readers may compare their statements with those made by the experts in the employ of the Royal Baking Powder Company, and form their own conclusions.

A careful perusal of the record will show that at

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last the light of day has explored the whole structure of the defamation and vilification selfishly practiced by Royal to poison the mind of the public and to fool physicians, domestic science teachers and students, as well as the housewives, into the belief that they must pay extravagant prices for a baking powder manufactured by a firm already convicted of fraud upon the public, and whose business for the past fifty years has been tottering upon a basis of misrepresentation and deceit. Such practices must be abhorrent to all who believe in decency and fair play.

Now follows the sworn testimony of physicians, chemists, biologists, physiologists, dietitians, teachers and home economic experts. It is all interesting reading and you will be able to form your own conclusions.

Sworn Testimony

(Verbatim excerpts)

from Records in Docket No. 540

before

FEDERAL TRADE COMMISSION

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TESTIMONY—EARL BLOUGH

EARL BLOUGH, was thereupon called as a witness, and being duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. BROWNELL: *What is your full name, Mr. Blough?*

A. Earl Blough.

Q. *Where do you reside?*

A. No. 5821 Ferry Street, Pittsburgh, Pennsylvania.

Q. *What is your occupation?*

A. I am Technical director of the Aluminum Company of America.

Q. *What is the business of the Aluminum Company of America?*

A. The production and manufacture of aluminum in various forms, including aluminum cooking utensils.

Q. *How long have you been with that company and what experience have you had with manufacture of aluminum ware?*

A. I have been with the company something over nineteen years, approximately twenty years, either as Technical Director or as Chief Chemist, and in that time I have had direct contact all the time with the manufacture of cooking

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utensils, and to a great extent, the selling in case of reference of technical questions from the cooking utensil department to the technical department.

Q. *Are you connected in any way with an association of aluminum ware manufacturers?*

A. The Aluminum Cooking Utensil Company, which is the subsidiary of the Aluminum Company of America, handling cooking utensil business of the Aluminum Company of America, is a member of the Aluminum Wares Association and, to that extent, I am acquainted with the working operations of the Aluminum Wares Association, because our subsidiary company is a constituent member of the Association.

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EXAMINER AVERILL: *To that extent, I would have to agree with counsel, but I do not think that is the intention of the witness, although the language used by the witness would indicate that he was here on behalf of the Aluminum Company of America, and its subsidiary company. I am not inclined, unless that is more clearly shown, to think that that is the case. I could not, of course, accept in this proceeding this evidence as being offered on behalf of a third party until that third party had made application to the Commission and had been admitted into this proceeding as a party to the proceeding. In other words, as an intervener. But, as I understand—if I am wrong, why, counsel on either side will correct me—but, as I understand, or sense, from what the witness has said, it appears that he is only stating now the reactions or the feelings on the part of his companies when they learned of this evidence, which they felt was in some way injurious, possibly to their business. I imagine that they then communicated with counsel for the Commission and advised him that they felt that they had evidence at his disposal, if he desired it, which would tend to refute or might tend to refute the testimony given by the two witnesses named; that, upon an examination of the character of the evidence which they had to offer, counsel for the Commission felt that it would tend to rebut the testimony previously given and that he thereupon availed himself of the opportunity of using such evidence, and that this evidence is offered in behalf*

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of the complainant, which is the Commission, in this instance, in an attempt to rebut the evidence of Doctors Geis, and of Prof. Prescott. Now, if I am wrong there, counsel will please correct me, because if this witness is appearing here primarily as a witness on behalf of the Aluminum Company of America, or of its subsidiary company, then I would have to rule that, until the Commission had admitted them as interveners, I could not receive the evidence from that standpoint; but I just sense that that is not the case. I do not know; I have never had any conversation with counsel about it, and did not know that these gentlemen were going to be here, but I sense that that is it. Am I right or am I wrong?

MR. BROWNELL: You are entirely right. There is absolutely no sense of an intervention. I think counsel for respondent occasionally forgets the nature of this proceeding. This proceeding is by the Commission against the Royal Baking Powder Company for alleged unfair practices. There are two parties, the Commission is one, and the Royal Baking Powder Company another. Now, in the course of the proceedings, it is and has been common to bring in representatives of various business organizations. Both sides have done it, and, naturally, they are the witnesses, and this witness is in no more sense representing an intervener than all our other witnesses have been representing interveners on the part of their respective organizations. So far, the questions directed to this witness were to bring out how he became interested in this proceeding and later, it will be developed what he did. It is no intervention. It is to rebut evidence that has been introduced by the respondent.

EXAMINER AVERILL: *Now, unfortunately, the language of the witness, as it stands, would undoubtedly convey the idea that he was here on behalf of the Aluminum Company of America and its subsidiary when, as a matter of fact, I understand he is here at the instance of counsel for the Commission in order to present such knowledge of facts, and expert knowledge, through the expert who has been employed which may aid counsel for the Commission in an attempt at rebutting the testimony given in this case previously by the two witnesses named.*

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MR. BROWNELL: That is it. Not only to rebut their testimony but to rebut testimony of others who have not been specifically named, in regard to the effect of the ingestion of aluminum.

EXAMINER AVERILL: *I did not mean to restrict it to the two witnesses named. I only used those two names, because they were the only ones named up to this time.*

MR. MOORE: Mr. Examiner, hear me somewhat further on this. I want to present this thing as it seems very clear to me.

EXAMINER AVERILL: *Yes.*

MR. MOORE: This witness and the witnesses called at his request, are called, as the record clearly shows, for single, specific purposes. As the attorney for the Commission has stated, there are certain issues in this proceeding, clearly defined. The Commission has presented their case. The respondent has presented its defense. They related to certain advertising statements. The complainant, the Commission, presented certain advertising statements, which the complainant claims were unfair trade practices, because of the nature of the statements made in them. The respondent defended and showed that there was justification for the statements made relating to baking powder. Now, here comes a witness who says that he represents an entirely third party, who, in some collateral way, by some collateral statement made by some witness in this proceeding, is injured, or is threatened to be injured by the testimony in the proceeding. He asked to come in, through the Commission, and set up a defense on a purely collateral matter. Now, as it seems very clear to me, this is an outside matter. It is not one of the issues in the case which anybody is entitled to rebut, excepting the Commission itself, and along certain definite lines. It is a matter entirely outside the issues and this simply results in an entirely new proceeding, a different proceeding which cannot be tried out in the present proceeding. It is not proper rebuttal in any event, because it is entirely collateral matter. It is not rebuttal on one of the issues in this proceeding, which are very clearly defined by the complaint and the answer.

If I may add one word. It further appears, in bearing out my statement, that this is an attempt to try out a new issue and de-

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velop a new proceeding here, that this witness came here, not in behalf of the Commission, but according to his own admission, on behalf of the Aluminum Company of America and its constituent companies in order to protect something that they say is threatened. Now, they have their remedy in a proper proceeding and at a proper time, and it seems to me that it is wholly improper by a device of this kind to permit a third party to be injected into this proceeding.

EXAMINER AVERILL: I will ask the witness a few questions to develop that fact:

BY THE EXAMINER: Q. *Did you or did you not come here at the request of counsel of the Commission?*

A. I came here at the request of counsel for the Commission. At the request of the Commission.

(Discussion off the record.)

EXAMINER AVERILL: *As I understand, what you have said, when you saw the extracts or copies of certain testimony that has been given in these proceedings, or when some of your company saw them, it incited, at any rate, an interest in that question among you. You thereupon decided that you would place at the disposal of the attorney for the Commission, certain data which was in your possession, which in your opinion would tend to correct or to rebut—I will use that term—the testimony which you had seen or read; that you also determined that you would get additional data which might tend to rebut that and for that purpose you employed an expert gentleman, who was familiar with those particular things, and had him conduct certain experiments or conduct certain researches along the lines indicated by the testimony which you read, and which you thought could be successfully rebutted. At some stage of that period, you communicated with the Commission or its counsel and advised them that you had certain facts, certain data, certain expert opinion or evidence which you would like to place at their disposal; is that or is that not a correct statement?*

A. That is a correct statement, and it was done in this way: The first information with regard to the testimony of Prof. Geis was sent to us by the R. B. Davis Company and as soon as I could, I came on to New York with the evidence that

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we had, and I had a conference with the attorney for the Federal Trade Commission and showed him what we considered evidence bearing upon the question of the effect of small amounts of aluminum salts, the probable effect on the human system, and the attorney for the Commission felt that that evidence would be suitable for rebuttal against Geis' testimony. Accordingly, he requested that I testify and submit that evidence as rebuttal to the Geis testimony.

EXAMINER AVERILL: *Then, as I understand, you are here today as a witness at the request of the counsel for the Commission in order to present the data, which is either an opinion of yours or other experts in connection with this question of the harmfulness or un harmfulness of certain aluminum salts on the human system, as rebuttal in connection with the testimony, after you had read and possibly studied it?*

THE WITNESS: That is correct.

EXAMINER AVERILL: *Are you here under subpoena?*

THE WITNESS: I have been handed no subpoena.

EXAMINER AVERILL: *But you came at the request of counsel?*

THE WITNESS: I came at the request of counsel with the understanding that a subpoena would be issued if necessary.

EXAMINER AVERILL: *A request is sufficient, as in this instance, and as counsel has shown that you are to some extent, at any rate, an interested witness—I don't mean that as a reflection, but that you take an interest in the matter, so that you are here in a certain sense voluntarily, but I don't think that a subpoena is essential.*

THE WITNESS: Yes, sir.

MR. BROWNELL: I might say for the record that a subpoena for this witness and the succeeding witness is here in the office.

EXAMINER AVERILL: *Oh, that is not necessary. Does that clarify the situation in your mind, Mr. Moore?*

MR. MOORE: Yes, I am not pressing this matter of the subpoena, because I think that is rather immaterial, and I need not waste any time in discussing that. I understand, then, that your

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Honor is going to rule permitting the witness to testify, so I should like to have my objection noted briefly at this point, if you will rule.

EXAMINER AVERILL: *I asked you if the witness' answers were clear to you—if it clarified his position in your mind, and I thought you said "Yes," so I would not have to pass upon a formal objection, but if you have a formal objection to make, you may do so.*

MR. MOORE: In addition to the grounds of objection heretofore stated, I object to the introduction of this testimony as it appears that it is, in effect, the trying out of a collateral issue on the part of a third party and not properly before the Commission. If it were proper at all in this proceeding, it would be as an intervener, after application to the proper tribunal and an order permitting intervention by such tribunal; I object further on the ground that it is not true rebuttal, but the trying out of issues that are entirely collateral to the issues in this proceeding; on the further ground that it is immaterial and irrelevant.

EXAMINER AVERILL: *Gentlemen, the objection is overruled, because it is very clear to the Examiner that while the witness did, in the early part of his testimony, use language which might be interpreted as his appearing here as an intervener, yet in answer to further questions put to him by the Examiner, it appears that this language, when used by the witness, was simply a statement of his own attitude and not a statement of the real fact as to how he is present as a witness. It is very evident that in this proceeding a third party cannot be introduced unless proper application has been made to the Commission and the Commission had decided to permit intervention, and I do not admit this evidence for one moment as evidence on behalf of the Aluminum Company of America or of any of its subsidiary or affiliated companies and I shall not permit during the course of the examination, any questions or answers which might tend to show anything in connection with an effect upon the Aluminum Company of America or any of its associated or affiliated companies, but will admit this testimony because from what has been stated by the witness it appears that he has data and has knowledge which may tend to rebut the statements made by Dr. Geis and Prof. Prescott, and possibly by others, in connection with the absorp-*

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tion of aluminum from cooking utensils made of aluminum ware and may further, as he has intimated, I think, tend to show whether small quantities of aluminum, even if they are soluble and can be diffused through the human system, may or may not be harmful. On those points I think that is clearly rebuttal testimony and I cannot say that it is collateral matter that is being introduced, because this testimony was introduced on behalf of the respondent, and what the witness is now going to testify to, as I understand, will be clearly in rebuttal of the statements made by the two witnesses.

MR. MOORE: Will your Honor permit me an exception?

EXAMINER AVERILL: Certainly, sir.

BY MR. BROWNELL: Q. I think you were telling us, Mr. Blough, about your employment of Prof. Edmunds, and I asked you a question as to what matters you asked Prof. Edmunds to inquire into; will you please tell us now what questions you presented for Prof. Edmunds' investigation?

MR. MOORE: I object to that on the ground that any conversation between him and Prof. Edmunds is entirely irrelevant and immaterial.

EXAMINER AVERILL: Wouldn't that come better from Prof. Edmunds when he is on the stand, as to what problems were submitted to him and what problems he investigated and what results he obtained from those investigations? I don't think it is necessary in Prof. Edmunds' testimony that he show that he had any particular communication with this witness; he had his own problems submitted to him, and he investigated them, and the result of those investigations you may inquire into. I don't think it would assist us in having this witness tell us what he told Prof. Edmunds to do or anything of that kind.

BY MR. BROWNELL: Q. Without insisting on the question, I shall pass to the next: Have you, in your employment, in the regular course of your work, ever had a question presented to you concerning the possibility of aluminum dissolving from aluminum cooking utensils and its possible effect upon the human body?

A. I have had such.

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MR. MOORE: That is subject to the same objection.

EXAMINER AVERILL: *The same ruling.*

MR. MOORE: The same exception.

EXAMINER AVERILL: *That will be the general objection to all this testimony unless you come to some specific point, such as an objection to the form of the question or anything of that sort, will that be the understanding?*

MR. MOORE: Yes, sir.

EXAMINER AVERILL: *Counsel for the respondent is allowed an objection to all the testimony of this witness and the objection is overruled, and a general objection is granted to counsel. Counsel, however, will, if he has any objections to make to questions as to form or to anything except to the general testimony of this witness, if he will kindly state it, we will consider that.*

BY MR. BROWNELL: Q. *When did that question first come before you?*

A. The first time that that question was brought to my attention, of which I have any definite memory, was in 1911. That is the first recollection or record I have.

Q. *Will you state how the matter came to your attention and what you did at that time?*

A. The matter was brought to my attention by means of a letter, I presume; because it is so long ago, I don't have that letter in front of me, it was from our Vice President, Mr. Charles M. Hall, calling my attention to an article which had been printed in a journal called, "The Ohio Farmer," under date of December 31, 1910. While I do not have here a copy of that article, that is the name of the journal and that is the date of its publication. In considering the article brought to my attention by Mr. Hall, I prepared an answer to the article so that it could be used as a publication if Mr. Hall, if anybody so desired, to transmit it to that journal, and I have here a file copy of a letter I wrote back to Mr. Hall, this letter being dated January 17, 1911, giving my answer to the article in question. Now, I do not know whether you want to have this read as part of the evidence

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or simply submitted as a part of the evidence, but I would like to emphasize certain points.

EXAMINER AVERILL: *No, we cannot consider the question of the letter. You are here yourself and you can testify that there were certain matters raised by this communication which your company received. Now, state what these were, that is, if that communication raised the question as to whether the aluminum that is in cooking utensils could be dissolved and in that way possibly absorbed; state whether that was the question which you were called upon to consider and then state, not what you wrote for publication, because that is not the point, but what you did in connection with that. I mean, what research or experiments, if any, you may have made bearing on the points raised by that. Do you see what I mean?*

THE WITNESS: Yes, sir. The writer of the article which was brought to my attention raised the question of the possible stomach trouble being produced by the use of aluminum cooking utensils, and this stomach trouble having been caused presumably by aluminum salts which were dissolved from the utensils. The writer of the article based his conclusions upon some tests which he made with aluminum wire suspended or immersing in tartaric acid—that was one of the acids he used for his tests, and he weighed the wire suspending or immersing in tartaric acid and determined that there was a certain amount of aluminum dissolved from that wire. From that experimental evidence, he deduced that the aluminum utensils when used in cooking various foods that contained tartaric acid or presumably other acids, could produce sufficient salts or compounds to produce stomach trouble or other illness. In order to refute that opinion, I looked at the matter from a practical standpoint. I did not conduct any tests upon rats, feeding of rats, or human beings, or rabbits, or anything of that kind, but I considered it strictly from the standpoint, if I may use the term, of common sense, and made quite an investigation of the occurrence of aluminum in ordinary foods. For example, I at that time, in 1911, had available a book called Langworthy & Austin, which seemed to be a very good source of information with regard to the occurrence of aluminum in divers and sundry foods like, for example, bread, ripe apples, peas, rhubarb, wine, blueberries, ripe cherries, grapes, milk, eggs, and I also took as an example, Detroit river water. From the

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data in Langworthy & Austin with regard to the alumina,—I speak of “alumina,” because that is the base that we used to measure with, I calculated the amount of alumina that there would be in any given, definite quantities of bread, ripe apples, peas, rhubarb, wine, blueberries, ripe apples, grapes, milk, eggs, and Detroit water.

MR. MOORE: Mr. Examiner, pardon me a moment, it does not appear that this gentleman is a physiological chemist or that he conducted any scientific investigation, and I object to his testimony along those lines.

EXAMINER AVERILL: *He has so far testified just what he did.*

MR. MOORE: He might be allowed to testify by reference to the literature. I am just raising the question at this time so that he confines himself strictly to such action as he took.

EXAMINER AVERILL: *So far, Mr. Moore, the witness has stated just what he did and has not ventured any opinion. Until he finishes stating what he did, I am not in a position to rule whether it is in the nature of expert testimony or whether it is in the nature of fact testimony, which came under his own knowledge of facts. So far as he has gone with his testimony, I don't know what he did. He simply said that he took this book.*

MR. MOORE: He referred to certain literature.

EXAMINER AVERILL: *He did certain things; he started to tell about with reference to certain edibles and drinkables. You may proceed.*

THE WITNESS: In the case of bread, I used the basis of a four-pound loaf:

Ripe apples,	1 pound	Ripe cherries,	1 pound
Peas,	1 pound	Grapes,	1 pound
Rhubarb,	1 pound	Milk,	1 pound
Wine,	1 quart	Eggs,	1 pound
Blueberries,	1 pound	Detroit river water,	1 quart

The respective amounts of alumina in those quantities I calculated from the data given in Langworthy & Austin to be the following, in grams:

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In the case of bread,	.156,	Ripe cherries,	.272,
Ripe apples,	.108,	Grapes,	.011,
Peas,	.016,	Milk,	.013,
Rhubarb,	.0157,	Eggs,	1.56,
Wine,	.295,	Detroit river water,	.0092;
Blueberries,	.0227,		
all of these in grams.			

Referring to these calculations, I may say I took these quantities of four pounds of bread, for instance, and one pound in the other cases and one quart in two cases, to represent, not an excessive amount of food; it doesn't take one a very long time to eat four pounds of bread, nor a very long time to eat a pound of peas or a pound of milk or a pound of eggs, and not so very long a time to ingest such an amount of food and get the corresponding amount of alumina, although the alumina presumably occurs in the respective foods in a different form, corresponding to the food, and in some cases I presume phosphates and so forth corresponding to the acid in the food. I took that data and compared it to the data given in the article published in "The Ohio Farmer" under date of December 31, 1910, and took the loss of weight given by the author, which was over a period of 126 hours, reduced that to a time which would be, say equivalent to the ordinary preparation of a meal, two hours, which would be about the time consumed for the preparation of a meal, and I wanted to see how much more alumina would be obtained in eating these respective amounts of food than would be obtained by cooking in aluminum ware three hours in tartaric acid, which was used by the author of the article, because it bears a very distinct relation between the amount of alumina that we eat in our daily foods.

In the case of bread, in eating four pounds of bread, you will eat, from the data in these two journals, 830 times as much alumina as would be obtained by dissolving the aluminum in the tartaric acid for a three-hour period, corresponding to the assumed period of preparing a meal.

In the case of ripe apples; you would eat 574 times as much, that is, in eating one pound of ripe apples;

In peas, you would be eating 85 times as much;

In rhubarb, 83 times as much;

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In drinking a quart of wine, you would be ingesting 1,560 times as much;

Blueberries, 120 times as much;

Ripe cherries, 1,440 times as much;

Grapes, 58 times as much;

Milk, 69 times as much;

Eggs, 8,300 times as much;

And Detroit river water, 49 times as much.

From which data I drew the conclusion that the human system took in, by means of its daily food—

MR. MOORE: Now, just a moment, I object to this.

EXAMINER AVERILL: *Why, Mr. Moore?*

MR. MOORE: Because it does not appear that he knows; he is drawing a conclusion about the effect—

EXAMINER AVERILL: *No, he is not; he hasn't said a word about its effect; he said he drew the conclusion that the human system took in so much. Assume that the figures that he has given are correct, certainly he could state what would be the result of it, just as if he were doing a mathematical calculation. He could say that as a result of this work, there were 560 people present at a meeting, but that would not be expressing an expert opinion, that is a fact or based on an opinion he himself has given; he has not attempted to say anything about the physiological effect; he is just talking about the amount taken into the system, isn't that it?*

THE WITNESS: Absolutely.

EXAMINER AVERILL: *You may proceed.*

THE WITNESS: Will you please read as far as I have gone?

(The question was thereupon read by the reporter as above recorded.)

THE WITNESS: I drew the conclusion that the human system took in by means of its daily diet, a relatively large quantity of alumina, when compared to the quantities discussed by the

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author of the article in "The Ohio Farmer," and that if the author of the article in "The Ohio Farmer" drew the conclusion that the quantity he mentioned was injurious, he must also draw the conclusion that the ingestion of the quantities that are taken in in the daily foods are more injurious than the quantity he had under consideration, because in the form in which the alumina occurs in the respective foods taken, it must occur in a variety of compounds and there must, at least in the whole range which I have read, from bread to Detroit river water, be some which are injurious, if they are injurious at all. Therefore, from the figures which I have at hand and have had under consideration at the time from the data in the publication, I drew the conclusion that the human system certainly was able to take care of a certain very definite quantity of alumina when ingested in its daily food.

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TESTIMONY, JAMES E. BOONE

Q. *Where do you reside, Dr. Boone?*

A. Columbia, South Carolina.

Q. *What is your occupation?*

A. I am senior physician of the South Carolina State Hospital.

Q. *How long have you been there?*

A. Seven years; approximately seven years.

Q. *And you are a registered physician in the state?*

A. Yes.

Q. *I suppose you have had the usual education and training necessary for that profession?*

A. I had a medical course at Clemson A. and M., and four years in medicine at the South Carolina Medical College.

* * * * *

Q. *The patients in your hospital are fed with bread stuffs prepared with SAS powder, are they not?*

SWORN TESTIMONY

A. We do not know any other kind of powder but that in the hospital and have not since August 20, 1923.

Q. *Have you ever observed any illness or condition of disease which you could attribute to any action of the food prepared with this baking powder?*

A. No, sir.

Q. *Do people in your part of the country use a good deal of hot biscuits and bread?*

A. They use a great deal of it, yes, sir. It is one of the main articles of diet.

Q. *Have you as a physician ever known of a case of illness—*
MR. REIGHARD (interposing): I object.

Q. (Continuing)—*due to the use of food prepared with SAS baking powder?*

MR. REIGHARD: I object to that until the witness shows how extensively his practice has been among the people. He has testified that he has been for seven years in this hospital, but that does not show that he has been in general practice.

EXAMINER AVERILL: *That would only go to the question of its weight. If the witness had not been qualified fully to show a very extensive acquaintance and very extensive opportunities for observation, his statement that he had not observed anyone, if he made such a statement, would only be limited to that which was within his ken. I think the question is permissible.*

A. No, I do not know of any cases.

Q. *And have you ever heard of one?*

A. No, I never heard of one.

* * * * *

Q. *Doctor, I ask you to read us the ingredients clause on the can which you say is a sample similar to those used during the period which you have referred to.*

A. (Reading): "This baking powder is composed of the following ingredients and none other: Specially prepared acid phosphates, bicarbonate of soda, sodium aluminum sulphate,

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corn starch, and 15/100 of one per cent dried white of eggs." That is all it says on here.

- Q. *The Davis baking powder which you say was used from time to time prior to August 20, 1923, was the same powder, so far as you know?*
- A. I could not tell whether it was or not. We used several different brands of baking powder and whether this was the same one now and then I could not tell you.
- Q. *Are you able to say whether or not the powders used prior to August 20, 1923, which contained, I believe you said, sodium aluminum sulphate, also contained acid phosphate of lime?*
- A. I know they contained a sodium aluminum sulphate. I do not know about the other.
- Q. *Doctor, tell us what particular attention has been given by you to the consideration of baking powder as a possible cause of illness, during your seven years at this institution?*
- A. Why there have been no symptoms observed in any of the patients, to call my attention to it. I treat all the illness in the white male department personally, but we have had nothing to come up that looked like a case of poisoning, so far as I know.
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TESTIMONY, MISS ALICE BRADLEY

MISS ALICE BRADLEY was thereupon called as a witness, and having been duly sworn, testified as follows:

DIRECT EXAMINATION

- BY MR. REIGHARD: Q. *State your full name, please.*
- A. Miss Alice Bradley.
- Q. *Where do you live?*
- A. Hyde Park, Boston.
- Q. *What is your present occupation?*

SWORN TESTIMONY

A. I am the principal of Miss Farmer's School of Cookery, and cooking editor of the Woman's Home Companion.

Q. *Where is Miss Farmer's School of Cookery?*

A. 30 Huntington Avenue, Boston.

Q. *Will you give us a brief statement of your education, training and experience?*

A. I was educated in the Boston Public Schools, graduated from the Boston Cooking School; taught three years in Canada; for three years was dietitian in the Boston hospitals; nine years associated with Miss Fanny Farmer at Miss Farmer's School of Cookery; taught two years in New York City; had three summers' experience in catering to a summer camp of 100 to 200 members; and since 1915 have been principal of Miss Farmer's School of Cooking, and of course naturally have read widely and have had special work at teachers' colleges and other schools.

Q. *Tell us about Miss Farmer's School of Cookery. What it is, and what sort of people it trains, and what sort of training is given.*

A. Miss Farmer's School of Cookery was started by Miss Farmer, after she left the Boston Cooking School of which she had been principal for a number of years. The Boston Cooking School was one of the first, if not the first, cooking school in the country. Miss Farmer started this school primarily for the benefit of housekeepers, young and old, who wished to know more about cooking in their own homes, or to use it in a commercial way. And most all our pupils are young women who have not had sufficient training in their homes to make them fully competent to cook as they would like to do in their new homes, many of them are older women who have had a good deal of experience, but who want to learn how to make new dishes which they are not familiar with. Many of them have been going to our administration lectures for 15 or 20 years. The pupils come from all over the country at the present time. The school is widely known. We have pupils from California and Texas, and all the way in between.

* * * * *

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- Q. *Do you have anything to do with the revisions of the Boston Cooking School cook book?*
- A. We occasionally suggest changes, yes.
- Q. *Have you yourself suggested changes?*
- A. Yes, and I have added one or two chapters to it.
- Q. *Can you tell me the approximate date of the last revision of that book?*
- A. September 20, 1923, I think it was; it may have been September 15. I am not just sure of the date.
- Q. *Are you familiar with that revision of the last edition, which dealt with the kinds of baking powder and their constituents?*
- A. Yes, I know about the changes there.
- Q. *Will you tell us about what changes were made in the text of the books as regards the effect of the so-called alum, or so-called alum phosphate powders?*
- A. I don't know that I can quote them verbatim; but there was originally a sentence to the effect that alum powders were harmful, and that sentence was taken out because the findings of the Federal Commission or some powerful body seemed to conclude that it was not necessarily harmful.
- Q. *Did you suggest that particular change, Miss Bradley?*
- A. I believe I was asked to suggest the change and to call it to the attention of the person who has charge of the revision. But of course it was not in my province to make the change.

MR. BROWNELL: That is all.

TESTIMONY, T. J. BRYAN, Ph. D., D. Sc.

- Q. *Have you made any special study of baking powders of various sorts?*
- A. I have.
- Q. *There are baking powders, numerous baking powders, are there not, which contain some compound of aluminum?*

SWORN TESTIMONY

A. There are.

Q. *What is the aluminum compound commonly used in baking powder?*

A. Sodium aluminum sulphate, the only one I have ever found in baking powder.

Q. *Commonly known as SAS?*

A. Yes.

Q. *Who manufactures SAS?*

A. There are three manufacturers at the present time, and three only, the General Chemical Company, the Superior Chemical Company of Joliet, and the Calumet Chemical Company of Joliet, which is a subsidiary of our company. It was formerly manufactured by the Kalfleisch Manufacturing Company.

Q. *Has the material SAS any other use to your knowledge than as an acid ingredient in baking powder?*

A. No, it has not.

Q. *How long has it been used as an ingredient of baking powder?*

A. Over thirty years.

Q. *Where can SAS be purchased?*

A. From the manufacturer or from his agent.

Q. *Is SAS sold in any small quantity?*

A. I never heard of it being sold in less than a barrel lot.

Q. *Can you buy it at drug stores?*

A. You cannot.

Q. *Is SAS an alum?*

A. It is not.

Q. *What is alum?*

A. Alum is a double sulphate or selenate of a monovalent and trivalent metal with 24 molecules water crystallization.

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- Q. *Just a minute, doctor. Are you defining alum, or is that a general definition for the alums?*
- A. I understood you to ask me to define alums, with the S on the end.
- (Discussion off the record.)
- Q. *To straighten out the record, will you first explain, Dr. Bryan, what you understand to be alum?*
- A. Alum is a potassium aluminum sulphate, 24 molecules water crystallization.
- Q. *Is there in your opinion any other substance which is alum?*
- A. There is not.
- Q. *Will you then repeat your definition of what the substances known as the alums are?*
- A. Alums are double sulphates or selenates of a monovalent and trivalent metal, with 24 molecules of water crystallization.
- Q. *Is it proper to describe any member of the group of alums as an alum?*
- A. It is. That word "an" modifies it and shows that it belongs to a group.
- Q. *That is, there is a group known as the alums, and any one member of this group may be termed an alum, but if you use the word alum alone, you mean the single substance you have reference to?*
- A. That is exactly what I mean.
- Q. *Isn't that a rather uncommon thing, Doctor Bryan, to take one member of a class and apply the class name just to that one?*
- A. No, we do that with reference to several things, commonly.
- Q. *Will you illustrate, please?*
- A. All of us are asked for salt at the table, and when we ask for salt at the table we want only one thing, sodium chloride. There are hundreds and hundreds of salts, but only one is entitled to the name salt, the commonest thing of that kind

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which is in use. With alcohol it is the same. You speak of alcohol, and you always mean the thing which is Ethyl alcohol, which is assumed by a large majority of people not to be poisonous; whereas wood alcohol, another one of the substances in the class of alcohols, is poisonous. If wood alcohol were given to you in the place of Ethyl alcohol when you ask for alcohol, you could prosecute in any court. And sugar, why sugar means only sucrose; although there are other sugars—there are many other sugars. There is a class of sugars, just as there is a class of salts and a class of alcohols.

Q. *And following this custom, it is your statement that alum means just this one substance, potassium aluminum sulphate?*

A. It means only that one thing.

Q. *Will you explain, Dr. Bryan, what are the common characteristics of all substances which are grouped under the name of alums?*

A. Their structure is all the same, the chemical structure. They all have 24 molecules of water crystallization. They all have four atoms, or four atoms of oxygen, united with every particle of sulphur or selenium. They all have the same molecular proportions of trivalent metal, and monovalent metal present, and without any one of those elements being present, you would not have an alum. If you did not have monovalent metal present, you would not have alum. If you did not have trivalent metal present, you would not have alum. If you did not have either selenium or sulphur present you would not have alum, but you can have alum without any of those first three substances that I mentioned, being the same in all of them. For instance, you do not have to have sodium to have an alum. You do not have to have potassium. There are several monovalent elements any one of which can take the place of the potassium in the ordinary alum, and you would still have alum. Aluminum is the trivalent metal in common alum, but that can be replaced with iron or with chromium or manganese; in other words, it is not necessary there should be any aluminum in the substance for it to be an alum. Sulphur is the common

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element present in the acid radical but that may be replaced by selenium. In other words, there are only two elements which are common to all alums, oxygen and hydrogen, and without oxygen and hydrogen being present, you could not have alum, and those must be present in all alums. There is no question that those two elements must be present.

Q. *Now, doctor, the names of some of the substances which fall within this class of alums?*

A. There is common alum; there is sodium alum; there is silver alum; lithium alum; rubidium alum; caesium alum. * * * —there can be sodium potassium, lithium, rubidium or caesium or silver or chrome alums. The same can be said with reference to manganese. In addition to that you may have part sulphur alums, and part selenium alums mixed. I do not mean to use that term mixed, but they are really chemical compounds, in which both the sulphate group and the selenate group are present.

Q. *You have been telling us the way in which the chemists group the alums, haven't you?*

A. I have.

Q. *Now, as I understand you, you said a substance must possess certain chemical structure to come under those groups?*

A. It must.

Q. *But the single elements of the same are interchangeable?*

A. They are.

Q. *I think you mentioned, did you not, that there is a sodium alum?*

A. I did mention that there is sodium alum. The existence of sodium alum has been questioned by so great a chemist as Ostwald, but in 1909 it was definitely proven that sodium alum does exist by Warren Rufus Smith. The reason that it has been in question is because it is so difficult to make. You cannot make sodium alum easily the way you can make the other alums. It can only be made between the temperatures of 10 degrees centigrade and 30 degrees centigrade, as is shown by the literature and by my own experience.

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Q. *After you have it made, is it possible to use it as an article of commerce?*

A. It is not. It will fluoresce within a very short time. Even when kept in an air-tight bottle, it loses part of its water of crystallization, and is no longer an alum.

Q. *Can you buy it at any chemical house?*

A. You cannot buy it at any chemical house in the United States or from any manufacturer in the United States, unless it be made to order.

Q. *Have you tried it?*

A. I have tried it. I have written letters to the Department of the Interior seeking information as to where it could be found, and to all large manufacturers following up every lead as to where they said I might be able to get it, and I finally got it from the General Chemical Company after I had received a letter, in which they said that they had never seen any, but they would try to make it for me, and they did make it for me, but it decomposed right after I got it.

Q. *So it is no good commercially, I understand?*

A. Commercially it is an impossible article.

Q. *Dr. Bryan, is there any difference between this soda alum, and sodium aluminum sulphate?*

A. Yes, sir; it (SAS) has absolutely no hydrogen in it, and the proportion of oxygen in it is entirely different, and it is impossible that it should be alum, because it has no water of crystallization in it.

Q. *Where can you buy alum?*

A. You can buy alum at drug stores or paint shops or chemical houses.

Q. *Can you buy SAS at those places?*

A. You cannot.

Q. *Or soda alum?*

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A. You cannot buy either.

Q. *You have told us how you classified alums generally, and the construction of common alum. Under your definition, Dr. Bryan, would you include sodium aluminum sulphate in the alums?*

A. I would not.

Q. *What does it lack to put it in that class?*

A. It lacks all the characteristics of an alum. It lacks the structure. Now, alums, besides having this chemical structure, have a physical structure also which is a characteristic of them. All of the alums crystallize either as octohedra or as cubes. SAS is a non-crystallin substance, and it has not the structure of an alum anyway, and lacks the element of hydrogen.

Q. *Dr. Bryan, we have some testimony from a chemist previously examined, to the effect that in his opinion SAS was not a chemical compound, but rather a mixture. What is your idea on that point?*

A. I would like first to admit that I do not know, and then tell what my opinion is.

Q. *Yes.*

A. When you get a substance that changes its character entirely when you dissolve it in water, it is very hard to state—it is very hard to study, you have to go according to the chemical analysis. SAS is a commercial product, which has been manufactured by the different manufacturers with different degrees of purity and with different refinements of manufacture. If it is manufactured, as I believe it ought to be, and as we manufacture it, we have to have one molecule of sodium sulphate to one molecule of aluminum sulphate in the final product. Now those are not soda alums, and when they are fused, or in that fusion, I see no reason under heaven why there is not a chemical combination that does take place, and why it is not a chemical compound. I know of no method of proving that it is a chemical compound, but it is my belief that it is.

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If it is roasted too long you will decompose it, and some manufacturers have roasted it too long, and partially decomposed it, with the result that there has been a basic alumina left in the finished product. Such a product is of course a mixture, no question about that; but if it is made under ideal conditions with proper care, you come very close to a commercial chemical compound.

Q. *As you get this material in the ordinary run of business, do you get about the same proportion of sodium sulphate and aluminum sulphate?*

A. Do you mean would our firm get it?

Q. *Yes.*

A. Yes, we have—I would have to limit that of course, to the present time, while we are making it. We have gotten it from others where it varied very considerably.

Q. *To get back to the practical use of these different substances, could you make a successful baking powder out of soda alum as an acid ingredient?*

A. You could not get enough soda alum to make any, and if you made it with soda alum it would decompose right away. The water in it would be fatal to its keeping qualities.

Q. *Have you any such difficulty with SAS?*

A. We do not. It is one of the best if not the best keeping baking powders that can be made.

Q. *Then in your opinion is it proper to describe the baking powder which your company makes as containing alum?*

A. It is not.

MR. MOORE: Isn't that a question of the opinion of the witness?

EXAMINER AVERILL: Yes sir; it is purely a question of opinion, but the witness is an expert and as an expert can express opinions.

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TESTIMONY, DR. RUSSELL H. CHITTENDEN

DR. RUSSELL H. CHITTENDEN was thereupon called as a witness, and having been first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. BROWNELL: Q. *Where do you reside, Dr. Chittenden?*

A. New Haven, Connecticut.

Q. *What is your occupation?*

A. Director of the Sheffield Scientific School of Yale University and Professor of Physiological Chemistry Emeritus.

Q. *Will you give us a statement of your professional training and experience?*

A. I graduated from the Sheffield Scientific School at Yale in 1875 with a Bachelor's degree.

I then served as laboratory assistant and instructor in chemistry for two years and a half at Yale. I then went abroad and in 1878 and 1879 studied physiological chemistry at the University of Heidelberg. I then returned to New Haven as instructor and graduate student and receive the degree of Doctor of Philosophy from Yale in 1880, and in 1882 I was appointed Professor of Physiological Chemistry at Yale, which position I held in active service until 1922, when I retired, Professor Emeritus for five years, and I served as the director and lecturer of the Department of Physiological Chemistry at Columbia University 1898 to 1903, I think.

Q. *Are you a member of some scientific associations and societies?*

A. I am a member of the American Academy of Sciences, a member of the American Physiological Society, of the American Academy of Arts and Sciences, the American Physiological Society, of which I was president for ten years, the American Society of Biological Chemists, being

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the first president of that society; the American Society of Naturalists, of which I served as president for one year, the Society for the Medical and Natural Sciences of Brussels, Honorary member of the New York State Medical Society.

Q. *Would you just say "and others?"*

A. And others, yes.

Q. *And during your work, Dr. Chittenden, have you served on numerous boards for inquiry into professional matters?*

A. I have been active in quite a number of different investigations having to do with problems on nutrition and related subjects.

I have served for one year as the expert for the War Department in connection with the problems, which arose after the Spanish War in feeding of the soldiers, the so-called Embalmed Beef Inquiry.

Then, during the War I represented the United States on the Interallied Scientific Food Commission of France and Italy and Great Britain in meetings and sessions held in London, Paris, and Rome.

Q. *Doctor, we have heard at various times and in various ways during this hearing about the Referee Board or the Remsen Referee Board, and yet no one has given us a general bird's-eye view of what the Board was and what its problems were.*

Were you a member of that Board?

A. I was appointed a member of that Board by President Roosevelt in 1908.

Dr. Remsen, the Chairman of the Board, and myself had one or two sessions with President Roosevelt and also with Secretary Wilson in which we were notified that the President had thought it very necessary to have a board of competent advisers appointed in order to settle disputed questions and to give judicial decisions with regard to the use of certain substances, such as preservatives and counter

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subjects that were in use in connection with American food stuffs.

Mr. Roosevelt especially emphasized, as he expressed it, the importance of this question for the American people.

The original Board was composed of Dr. Ira Remsen, the President of Johns Hopkins University at that time, of Baltimore, Dr. Christian Herter, Professor of Columbia University of New York, and Professor Alonzo E. Taylor, then Professor of Physiological Chemistry at the University of California, Professor John H. Long, Professor of Physiological Chemistry at the Medical school of Northwestern University, Chicago, and myself.

After a few years of service, Professor Herter died and Professor Theobald Smith, then Professor of Comparative Physiology at Harvard University, was appointed as his successor.

I might add that the Board has been in active service from the year 1908 to 1914, as I recollect it.

- Q. *Among the problems presented to the Board was there one concerning the use of different types of baking powders?*
- A. There was a problem presented to us under the general caption: Do aluminum compounds when present in food affect injuriously the nutritive value of such foods or render them injurious to the body?

That, I think, is the general trend of the question as it was put to us; however, in the formal presentation to the Secretary of Agriculture under, I think, three distinct headings.

At the time this question was put to us the Secretary of Agriculture remarked that the form of the question was due to the lawyers of the Board, but that essentially it meant simply what are the effects, if any, of alum baking powder, since so-called alum baking powder was the only form in which alum compounds entered into the food stuffs to any appreciable degree.

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Q. *Do you recollect when that particular problem was presented to the Board, what year?*

A. My impression is,—I should have to look up to be sure, but I think the latter part of 1911, because we began our work—I began my work early in 1912.

Q. *Did all of the members of the Board take part in the inquiry?*

A. Indirectly, yes; that is to say, we had various conferences in which all the members of the Board were present and participated and it was agreed that there should be three independent series of investigations carried on, one by Dr. Long in Chicago, the second by Professor Alonzo Taylor, then of the University of Pennsylvania, and the third by me at New Haven.

The whole Board participated in the study of the general problem of how to proceed in the case and the general method to be followed and the general trend of three distinct investigations.

Q. *And then each of you did proceed to carry out your part of the investigation?*

A. We did, yes.

Q. *And leaving now for a moment the details of what each of you did, when you had finished, you had each finished your work, what did you do?*

A. We had consultations and visited each other's laboratories during the period of the work, and then when the work was completed we had a conference considering all the results in detail and then each of us individually wrote up our own report and then again those reports were scrutinized by all of the members of the Board and then finally there was a brief compact report to the Secretary of Agriculture of a few pages embodying the general conclusions reached by the Board and signed by the five members and handed to the Secretary along with the more voluminous reports of the individual workers.

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- Q. *Was this brief report submitted in connection with your full detailed report signed by all members of the Board?*
- A. Signed by all members of the Board; it was signed by all members of the Board.
- Q. *Now, have you since seen bulletin No. 103 of the Department of Agriculture?*
- A. I have.
- Q. *Will you explain what relation, if any, that bears to the report which was signed by the Board itself, the Board members?*
- A. Well, I understand that this is a bulletin based upon the report submitted by the Referee Board but issued solely and entirely by the Department of Agriculture. I have read it through with considerable care and did at the time it appeared and have since, and so far as I can see it embodies faithfully the conclusions arrived at by the Referee Board.

In fact, you will note that many of its conclusions are introduced here in small type and in some other cases there are quotation marks, which imply a direct extract from the report of the Board.

* * * * *

- Q. *Now, at the outset of the work, Dr. Chittenden, of the Referee Board, did it have before it the appropriate literature dealing with the subject which you were to investigate?*
- A. All available literature, both in English as well as in French and German was gone through very thoroughly and examined with a view to determining the state of knowledge at that time with regard to the physiological effect of various aluminum compounds.
- Q. *And does it follow that the Board took cognizance of the literature in reaching the conclusions which it did reach in answers to the particular questions asked?*

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A. It took recognition of the available data but was naturally influenced, primarily, by its own findings.

Q. *What were the specific problems assigned by the Board to these various individuals, yourself and Dr. Long and Dr. Taylor?*

A. One of the first problems which the Board considered when it came to outlining its own work was what should be looked upon as a large quantity, in view of the specific form of the question presented to us by the Department of Agriculture.

After a very careful consideration, it was decided that quantities of aluminum in the daily food amounting to from 25 to 75 milligrams of aluminum were to be looked upon as the small quantity and that the larger quantity should be considered up to 150 or even 200 milligrams of aluminum per day.

It was felt, however, that it was very important for the Board to learn everything possible with regard to the effect of aluminum compounds as used in baking powder and the leavening of bread and therefore we decided to carry the experiment using quantities as large as a thousand milligrams of aluminum a day.

In view of the decisions, it became desirable, at least, for us to mark out rather definitely the scope of each man's work.

In my case it was decided that in the investigation to be carried on at New Haven stress should be laid upon the effect of the smaller doses of aluminum salts, and as a matter of fact, looking up my data I found that for a period of three months, 90 days, the average amount of aluminum taken by each subject was 68 milligrams, ranging from 65 milligrams a day to 75 milligrams a day, with an average intake of 68 milligrams of aluminum in three months.

Then we increased the dose and went up to a maximum of 260 milligrams per day, that portion of the work covering 40 days, so you see, small in time as compared with the preceding 90 days with the smaller doses.

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Furthermore, it was decided that in the experiments carried on at New Haven we should introduce the aluminum in baking powder in the bread, leavening the bread with the alum baking powder and giving it to the subject, giving the aluminum to the subject simply as alum baking powder bread and that is the form in which all the subjects at New Haven received the aluminum.

We had in all twelve subjects, eight of whom received aluminum for 130 days consecutively and four served as controls, and the maximum dosage was 260 milligrams.

Now, in the case of the other experiments, those carried out by Dr. Long and by Dr. Taylor, it was decided there that stress should be laid upon the effect of larger quantities, and furthermore that the aluminum should be given in a different form, and so, as the report shows, and it is probably in your records, the aluminum was introduced sometimes as aluminum hydroxide, or as aluminum chloride treated with the requisite quantity of sodium bicarbonate to give the reaction that takes place in the leavening of bread, and in some cases the aluminum was taken simply mixed with milk, sometimes with water and in other cases it was introduced sometimes in wafers or in tablets; in other words, the idea of the Board was to introduce, even though it was not the form in which the aluminum would ordinarily go into the system when taken in baking powder bread, to introduce it in different forms, so as to introduce variety and give the aluminum an opportunity if it had any power to exercise injurious effect as it might possess and in these two series of experiments, which did not cover just as long a time as mine, the dose was considerably higher, all of which embodied the bringing about of variety in the work as a whole.

Then, too, there was a difference in the procedure in regard to the analytical work carried on.

In the case of the New Haven experiment emphasis was put upon the idea of studying the effect upon digestion, absorption and utilization of the food, upon the utilization of the nitrogen or protein, fat utilization and the fat nitrogen

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and things of that sort, whereas in some of the other experiments more stress was laid upon determining upon the nitrogen, the various ways in which the nitrogen was eliminated from the body.

Questions of phosphorous balance, questions with regard to the absorption of aluminum by the blood, the elimination of aluminum by the urine and by the feces, all of which was presented as I said before, to give variety and cover the ground as broadly as possible, in addition, of course, in every case the subjects were under very careful medical examination; at the New Haven experiment they were examined medically every ten days during the whole five months, two weeks' period and blood examinations, of course, hemoglobin content and blood count and licedes count and orificedes count and so on.

Q. *And in your blood tests, were there also examinations made of the blood corpuscles as to their appearance?*

A. That was very carefully worked out by Professor Edgen in the bacteriological laboratory, I think, and somewhat by Dr. Rand, Professor Rand.

Q. *Then to sum up, Dr. Chittenden, is it correct to say that so far as you were able you took all the known ways of finding out completely the effect of the ingestion of aluminum compounds in the ways you described?*

A. We so considered it.

Q. *Now, will you tell us the result—I mean a summary of results of the work of these investigators?*

That is a broad question, but—

A. I think the summation is very clearly expressed in the final report of the Referee Board. I can enlarge upon it.

BY EXAMINER AVERILL: Q. *As set out in Bulletin 103?*

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- A. As set out in Bulletin 103. Certainly, in quantities up to 150 milligrams of aluminum a day there were absolutely no indications of any injurious or abnormal effect whatever.

* * * * *

- Q. *Will you describe in more detail, Dr. Chittenden, your own experiments which were made a part of the Referee Board report?*

- A. In the first place I would like to emphasize the fact that the men who composed the squad taking the alum baking powder breads were men ranging in age from 19 to 34 years.

They were men not selected for robustness but they were, of course, selected with a view to general good health so as not to have introduced into the problem any more variables than were necessary.

They were fed in the Yale dining hall in a special room under our own supervision and the bread which was the vehicle was made in our own bakery by a special baker who was under our own control, with the baking powder which was made in the laboratory out of sodium aluminum sulphate and sodium bicarbonate and corn starch.

The bread, the alum bread was baked each day with a definite content of aluminum, but in order to make quite sure as to the amount of aluminum which the men were taking, the samples of the bread were analyzed for aluminum each day.

The four control subjects were fed on bread which we had made in the bakery of the dining hall, with yeast, leavened with yeast.

The urine of these men was collected every day and subjected to analysis. The feces were collected and weighed each day and subjected to analysis in given periods, in periods of ten days, and the feces were separated so as to get a sharp division by means of carmine stain.

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The men were weighed each day and so far as the analytical work bearing on the general subject of their metabolism and nutrition the total nitrogen was determined in the urine and the food of course was analyzed each day; the food for each man was weighed each day and during the fore-period, four weeks, we found out the natural inclinations of the men, so that they were allowed to have about what they wanted, only of course we measured and weighed every particle of food that they consumed and then these blood samples were analyzed.

It is interesting, however, as giving an illustration of the variety, that the average daily intake of nitrogen in the alum subjects ran from 13.9 grams to 21.6 grams and the caloric value was about 3,000 calories.

The phosphate phosphorous was determined in the urine each day so as to get some light on the elimination of phosphorous and by the results of the analytical data which we obtained we were able to calculate the exact values with regard to the utilization of the protein food, the utilization of the fat, thinking of course that possibly the aluminum salt might exercise some deleterious effect on the digestion or on the utilization of either protein food or fatty food.

We found, however, no indication of any such result. All through that long period of three months with the smaller doses and even during the months of the third with the larger doses there was a complete utilization of the protein food and there was a complete normal utilization of the fatty food, as measured by the comparison with the control subjects.

It is understood, I assume, by many of you gentlemen that in a study of this kind examination of the daily excreta, and metabolic action is as good a way, as sure a way, of measuring changes that may take place in the tissues or organs of the body as any that we have.

Many disturbances, many—even lesions—are first suggested to the expert physiologist or physiological chemist

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by the recognition of some change in the excretions of the body.

It is a legitimate, a safe, reliable method of getting a picture of whether normal processes are prevailing or not. I think a very good illustration of that is shown in connection with a matter which I noticed in reading testimony which was brought up before you only the other day. It was in 1907, if I remember correctly, that a German by the name of Blum and his associate found that acids having two carboxyl groups, when introduced into the system brought about a very decided reduction in the excretion of urinary nitrogen, but it was not until 1912 or thereabouts that Professor Underhill in my laboratory, aided later by Professor Wells, found out that that acid and its salts brought about a distinct disintegration of the epithelial cells of the tubulæ of the kidney.

By EXAMINER AVERILL: Q. *What is that?*

A. Breaking down of the secreting cells.

During all this time in the New Haven experiments daily examinations of the urine showed no abnormal constituents. There were one or two cases of slight traces of reaction for albumen, but as marked in one or two of the control subjects as it was in the alum subjects.

Further in following that out there was no relationship between the albumen reaction, the slight traces of albumen reaction and the dosage of aluminum compound.

There was nothing abnormal, nothing irregular, nothing out of the straight normal composition of the urine that was found during the experiments to indicate any deleterious effect of the aluminum compound.

Q. *Then, of course, in addition to the details which you have just now given us, you, I think, have already said that you had various other examinations made, both medically and of the blood?*

A. Examinations of the blood were under the personal supervision of Professor Herter who made an examination at

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stated intervals all through the series of experiments and the medical examination of the men was made for ten days by Dr. Rand of the Yale Medical School, who reported on his findings each period and in his final report.

He says, for example, in his final report to me that (I think I have it here) he could find no evidence that the feeding in any way affected either general health and nutrition or digestion or had any effect on the excretory functions of the kidneys or intestines.

He determined mouth temperature and pulse rate and blood pressure examination of the heart and lungs, spleen, and liver, parastotic disturbances, gas formation in the intestines, and so on.

Q. *Now, after the publication of Bulletin 103 by the Department of Agriculture, did you see in the scientific literature any reports of subsequent investigations concerning the effect of aluminium in foods which indicated any error in the conclusions of the Board?*

A. I have not seen any results which would lead me to change my conclusions, which are a part of the conclusions of the Referee Board.

Q. *And if you were asked the same questions today which you had presented to you during the Referee Board work, would you answer them in the same way?*

A. I should, decidedly.

* * * * *

Q. *I think you have already stated, Dr. Chittenden, that the Referee Board did not find any proof of absorption of aluminium from feeding aluminized foods?*

A. We did not find any trace of absorption at all. Of course, you must bear in mind, however, and it is only fair to make that statement, that we are dealing not with alum per se, but

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we were dealing with the compounds which resulted from the interaction of sodium aluminum sulphate in the leavening of bread and pastry, and that what we had to deal with, especially in my experiments, was the oxide, hydroxide and possibly phosphate of aluminum.

Q. *Are these compounds of aluminum the forms which are left in food after preparation with a baking powder containing sodium aluminum sulphate?*

A. Those are the compounds that are left.

Q. *And I suppose that was the reason you used them?*

A. That was the reason we used them, yes.

* * * * *

Q. *Dr. Chittenden, have Doctors Geis, Wells, Hawk, Mendel, Myers and E. E. Smith who have given testimony in this case and Dr. Pease whose name has appeared frequently in this proceeding ever been under your instruction at Yale University?*

A. Dr. Pease was for a brief period instructor in the scientific school in bacteriology and all the other men named were students of mine in former days.

Q. *Is there any general statement, Dr. Chittenden, that you would like to add to your testimony?*

A. Well, there is one statement I should like to make, in order that my position may not be misunderstood.

We have been speaking so frequently of alum and alum solutions and then again of the residues from the baking powder bread with which our experiments have been mainly conducted, that I felt I should like to have on the record a clear statement as to my position with regard to alum or alum solutions and I have taken a statement from Professor Cushny's book on pharmacology and therapeutics, the 8th edition, 1924, page 670.

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Professor Cushny is the Professor of Pharmacology at the University of Edinburgh and is, I think I may say, one of the foremost authorities on the subject of pharmacology and therapeutics, and this is the 8th edition of 1924.

And the statement I want to read expresses practically my own opinion with regard to the action of alum in alum solutions as distinguished from residues in baking powders.

"Alum solutions have a sweetish astringent taste and in small quantities induce no symptoms except a feeling of dryness and astringence to the inner mouth and throat. Larger doses act as gastric irritants and cause nausea and vomiting and in extreme cases poisoning.

"Even the largest quantities, however, are followed by no symptoms except those of gastro-intestinal irritation and inflammation and the long continued use of alum does not elicit any symptoms of chronic poisoning.

"The aluminum salts are only absorbed in small quantities from the stomach and intestines so that no symptoms of general poisoning arise from the internal use of the salt.

"Aluminum vessels may be used for cooking or even upon the acid without danger of intoxication, as has been shown by the recent series of investigations."

Now, this summation by Dr. Cushny which is in his 1924 edition, I think, is a perfectly accurate and well-defined statement of our knowledge with regard to this matter, of the reaction of alum and it fits in perfectly with my own views as a result of my own experience and experiments and so I would like to have it on the record.

BY EXAMINER AVERILL: Q. *Doctor, you say there, speaking of the alum as distinguished from the residues left in bread as a result of incorporating in the bread the so-called alum baking powders, that is, baking powders made with sodium aluminum sulphate?*

A. Yes.

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- Q. *Would you mind, for the benefit of myself and the Commission as laymen, explaining what are those differences between these residues and between the sodium aluminum sulphate?*

For instance, if it were given as sodium aluminum sulphate; in other words, it was dissolved in water and taken that way or taken through the mouth as a powder; what are those differences in the residues that you speak of?

- A. I can make, perhaps, the point clear, by taking a very simple case of common salt, sodium chloride.

Now, common salt is a resultant of the reaction of two violent poisons. One is hydrochloric acid or muriatic acid and the other is caustic soda.

They react and make a neutral salt, sodium chloride; perfectly harmless.

Now, so-called alums which are double salts, the one that we have been dealing with, sodium aluminum sulphate is a double salt made up of sodium aluminum and sulphuric acid; now, when that salt, that double salt reacts with sodium bicarbonate the other component of baking powder in the leavening of bread, you have the elimination of carbonic acid as one product.

You have aluminum hydroxide as another product and then sodium sulphate, so that the aluminum which figures in the leavened bread, is not alum at all. It is simply the oxide of the element aluminum or the hydroxide, as the case may be. This is insoluble in water or practically insoluble in water, and may or may not be absorbed in the gastro-intestinal tract.

Is that clear?

- Q. *Have you read in the testimony of Dr. Wells, offered in this proceeding, certain statements in which the Doctor criticized Dr. Taylor's work in connection with the Referee Board report?*

- A. I have.

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Q. *Did you notice the criticism because of the fact that Dr. Taylor used the residues left by baking powder?*

A. I did.

Q. *What have you to say concerning that method of experimentation by Dr. Taylor?*

A. Well, it seemed to me that the criticism was uncalled for and should have been tempered to the facts in connection with the problem as presented to the Board. I will call attention to paragraph number 3 of the questions submitted to the Referee Board:

"If aluminum compounds be mixed or packed with the food is the quality of strength of such food thereby reduced, lowered or injuriously affected; in large quantities; in small quantities?"

Now, the whole object of the experiments as conducted by Dr. Taylor in some portions of his work and also by Dr. Long, was to answer that question in a way without reference to the conditions which exist when aluminum baking powders are used in conjunction with the leavening of bread.

Our understanding with the Secretary of Agriculture was that the primary object was the effect of alum baking powders on the human body when introduced as food in the leavening of bread, biscuits and pastry, but these questions were formulated in a somewhat peculiar way, and we felt it desirable for some members of the Board to carry on experiments with the aluminum compounds not baked in the aluminum and therefore Dr. Taylor tried experiments where aluminum hydroxide was simply emulsified with milk and was taken in that form.

In certain other cases mixed simply with water. In certain other cases aluminum chloride or salts taken away from it. There was another point which the Referee Board had in mind, and which we all, I think, felt was very important.

We were appointed to find out if possible, the truth, if aluminum compounds have an injurious effect when taken

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as they are consumed in baking powders, mixed with bread and so forth, but we felt that it was our duty to go to the extreme and study the effect of aluminum compounds under conditions perhaps not so favorable, and it was for that reason that Dr. Taylor simply broadened the scope of the work, broadened the field of our inquiry, by studying the action of aluminum compounds not combined with the bread and the dough and so on, introduced directly.

In other words, if aluminum is absorbed, if aluminum salts are liable to produce injurious effects, we ought to find out perhaps in a manner more easily; some things might come up. That is all.

Q. *I believe there was a statement, Dr. Chittenden, in the testimony of Dr. Wells, that scientific men have not accepted the report of the Referee Board as authoritative data.*

A. I saw that statement, yes.

Q. *What have you to say on that point?*

A. Simply that the scientific men of the world have not had an opportunity to judge. The report never has seen the light of day, so far as I know; never has been published. The only statement that has been made, so far as I can recall, is bulletin number 103, which summarizes our conclusions, or at least, some of them.

Scientific men, commissions, dealing with such problems would naturally want to see the data before accepting any reports regarding it.

I certainly should, if it was a matter in which I were interested; but the Government, for some reason, I think probably in part, because of the near approach of War, has never published the report on alum, never has published the equally voluminous report and even more voluminous report on sulphur dioxide and sulphites.

Q. *So if I understand you, the scientific men generally have been unable to form an opinion because they have not seen the report?*

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A. Have not seen the report.

Q. *And no valid criticism could be made until they did see the actual report?*

A. In my judgment, no.

CROSS EXAMINATION

BY MR. COX: Q. *Dr. Chittenden, in addition to your experiences to which you referred on your direct examination you have also testified as an expert in a great many cases and proceedings involving all sorts of questions from murders up and down, have you not*

A. I have, unfortunately.

Q. *Did you, on your direct examination, give us all the experiments or more accurately, reference to all the experiments that you have performed in connection with aluminum or aluminum compounds as distinguished from experiments on others with which you were familiar?*

A. I think that some 35 years ago there were carried out in my laboratory a few experiments with alum, but I am very vague and I think, I am not sure, it was never published, and I really can not tell at the present moment what it amounted to.

Q. *Well with that exception and the experiments which you performed in connection with the work of the Referee Board, have you been called upon to perform other experiments relating specially to aluminum or aluminum compounds?*

A. No, sir. The only work I have done on aluminum certainly in the last 30 years, has been in connection with the work of the Referee Board.

Q. *During what period were you director of the Sheffield Scientific School?*

A. 1898 until 1922, when I retired as Emeritus Professor, twenty-four years.

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Q. *And that is a large institution, is it not?*

A. It is so considered.

Q. *And did your duties as director of the Sheffield Scientific School, plus your other engagements, compel you to devote less time to giving the instruction in the matters which you have formerly taught?*

A. In some degree; and the difficulties increased as the years went on.

Q. *That is more than what one man could do?*

A. Yes, sir.

Q. *How many courses did you give after that?*

A. Oh, I lectured afterward to the more advanced students, I think up to within five years of my retirement, and occasionally in seminaries, I would appear with the graduate students up to the very end, but my work practically as instructor stopped five or six years before my retirement.

Q. *And prior to that time I believe you only gave one lecture course, did you not?*

A. Oh, yes. I gave two lecture courses and sometimes three and in the earlier years I was in the laboratory.

Q. *Yes, but I mean after you took over the direction of the scientific school, did you not have to confine your instruction practically to one or perhaps two lecture courses?*

A. Oh, no, I lectured to the medical school students three times a week for half a year and I gave at least three, and I think five, lectures a week to graduates and undergraduates for quite a number of years at least; perhaps fifteen.

Q. *Would you tell us, Doctor, generally whether physiological chemistry is not a comparatively recent science?*

A. It is comparatively recent in its importance, anyway.

Q. *And it is one that has in the past and is now subject to exceptionally rapid development?*

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A. It has developed very rapidly since 1875 say.

Q. *And it is fair to say, is it not, that notwithstanding that development, knowledge in that particular field is still very incomplete?*

A. Very incomplete.

Q. *And many matters still rest largely on opinion?*

A. Undoubtedly.

Q. *On your direct examination you referred to the fact that Doctors Geis, Wells, Mendel and others had all been instructed by you.*

You did not mean to imply that you taught them all they know now, did you?

A. I did not mean to imply anything quite as absurd as that. I believe I answered a direct question by the word "yes."

Q. *As a matter of fact, some of them opened up complete new chapters of knowledge in this matter, have they not?*

A. I think so, yes.

Q. *I mean the general subject of physiological action and so on?*

A. Yes. Professor Mendel, I might say, is my successor at New Haven. Dr. Geis I placed at Columbia as my assistant when I was there for five years.

Q. *Well, I just wanted to get rid of the implication which I think would have been an implication on the teaching; you would agree to that, would you not?*

A. Yes.

Q. *Now, you spoke of the work of the Referee Board and of beginning with interviews with the President or the Secretary of Agriculture or both.*

Did either of them explain to you the position of that Board under the law?

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A. We were told by the President, as I remember, that we were in a sense a judicial board.

Q. *Did he or the Secretary or both explain to you how it happened that while the statute left the determination of such questions as were committed to you to judicial tribunals, the determination was being transferred to you?*

A. Well, it was intimated that there was a great deal of dissatisfaction with some of the findings which had been reported and published and that it was felt necessary to put some of these questions into the hands of a commission to settle.

BY EXAMINER AVERILL: Q. *You mean findings that were published by the Government departments or findings of the Courts that had been published?*

A. Findings I suppose I may say of the Bureau of Chemistry, Department of Agriculture.

Q. *The subjects which were referred to your Board treating them for the moment collectively and generally, related to substances which had come to be artificially introduced into certain foods, did they not?*

A. They did.

Q. *That is, they were substances which presumably no one would eat by themselves, but had gotten into foods through what might be called modern development of manufacture on a large scale and so on; is not that the general nature of it?*

A. I think so, yes.

Q. *What were they, Doctor? I think they were benzoate of soda.*

A. One of the first problems submitted to the Board was the question of the healthiness of sodium benzoate. Then there was the problem of sulphur, sulphites more particularly as applied to the sulphite of the California fruits, and Western fruits.

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Q. *That is bleaching, isn't it?*

A. Yes, bleaching and preserving.

Q. *Yes.*

A. And then the action of saccharine, in which President Roosevelt was very much interested himself for some reason, and the action of copper salts and the action of alum compounds.

Q. *Now in connection with those substances, or at least some of them, there existed at that time a well-defined opinion, right or wrong, I am not asking you to speak of the merits of the opinion, that such substances were harmful and were or ought to be prohibited by the law; that is a fair statement, is it not?*

A. Not quite, I think, as I understand it.

Q. *Well, will you correct it?*

A. My opinion is that the starting of this line of studies was based on two points.

First, the law, or what was gradually becoming the law, and undoubtedly a very good one, of adulteration which carried with it the adding of something. That became a law. It was contrary to the law to add certain things.

Then came the question, gradually developed, with regard to the influence of this other addition on the health of the consumer.

As I look back over the years, I see that the latter problem first originated with the use of glucose. Now, there was an adulteration. In the first place, where it was introduced into ordinary sugar. Then came the question ultimately, whether or no glucose was harmful, and that question was submitted to the National Academy of Sciences by the President of the United States. That is a good many years ago. I think I did a little work on it when I was a youngster, and Professor Sellman, Professor Remsen, Professor Bower and I think Professor Johnson, Sam-

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uel W. Johnson, they are all dead now, excepting Remsen. There came a report from the National Academy of Sciences that glucose was perfectly harmless. It was nothing more than a form of sugar such as occurs naturally in the human blood, so that there were these two problems, the question of the law having to do with the addition of something which serves as an adulteration and then the question of the healthiness, and there came later a time when the effect of an adulteration under the law was strengthened by making that substance necessarily a portion.

BY EXAMINER AVERILL: Q. *You mean before the thing which was alleged to be an adulterant could under the law be excluded from its use in food products it had to be determined that the thing, that the adulterant in question, was unhealthy, is that the idea?*

A. Not that it had to be, but that it strengthened the position very much if it could be said that it was.

You see, adulteration has to do with an adulteration which simply affects the pocket book and then there is the adulteration which affects or may affect the health, directly or indirectly. No, I do not mean health, which affects the food value of the product, and then thirdly adulteration which may affect the health by the introduction of something injurious to the body.

Q. *But it was the Department of Agriculture that had to determine whether or not under the law as it then existed, as you understand it, had to determine whether or not the thing in question was truly an adulterant in the terms of the statute?*

A. I suppose so. I have not any personal knowledge of the judiciary.

BY MR. COX: Well, that is the department—I do not know whether this is objectionable, but as I understand it, the statute provides that the department and specifically the Bureau of Chemistry, have the responsibility of determining in the first instance whether the thing is adulterated or misbranded and then it proceeds to the courts.

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BY EXAMINER AVERILL: Q. *Of course, but as I say, whether it was at the time of these gentlemen, the question was undertaken, this inquiry, in connection with these various products, it was not for the purpose of enabling the Bureau of Chemistry, Department of Agriculture, to have before them data of what they deemed of a reliable source, in order that they might take the first step, if the first step appeared to be necessary, in connection with declaring these substances which were considered by the Referee Board, to declare these substances harmful and therefore to prohibit their use?*

BY MR. COX: Q. *No, perhaps that was explained to the Board.*

Was it your understanding, Doctor, that you were appointed, I mean the Board, to control and perhaps override the views that then existed in the Department of Chemistry?

A. Those points were never broached at all. The Referee Board simply understood that we were to answer to the best of our ability and with all the appliances which we could command, specific questions put to us by the Secretary of Agriculture. I merely mentioned, you will recall, that the President did say to us it was a sort of judicial body. I suppose he simply meant that our decisions would be accepted by the Department of Agriculture.

Q. *Well, that is what I was getting at, and in that connection I would like to know further whether you had explained to you and took into consideration any of the practical or what might be called legislative effects of these subjects, such, for instance, as preservative might render food available that would otherwise be lost, and so be a positive value and things of that kind, or did you confine yourself directly to the scientific effects?*

A. We confined ourselves very strictly to the scientific question put to us.

Q. *What I had in mind, for instance, was this: I understand that you found copper salts deleterious. That was not influenced by the fact that the only users of copper salts were foreigners?*

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- A. No, sir. We were not influenced at all, except by the facts which we had before us as results of our work.
- Q. *Now, the questions concerning aluminum compounds, at least that were put to the Board were formulated, I think you said, by the lawyers?*
- A. I merely threw that out as a suggestion, owing to the peculiar phraseology.
- Q. *Well, they were in effect in the words of the law, were they not?*
- A. I presume so. I am not an expert at law.
- Q. *In the organization of the Board, and to avoid confusion, I now confine the questions to this alum matter, the only doctor of medicine who worked on the aluminum matter was Dr. Taylor, was it not, the only doctor of medicine who was a member of the Board and worked on that problem, was Dr. Taylor?*
- A. I think that is right. I am not sure whether Dr. Long had an M. D. or not.
- Q. *In connection with your experiments you were assisted by a doctor of medicine, were you not?*
- A. I was.
- Q. *Who was that?*
- A. Dr. Rand, Assistant Professor of the Medical School then.
- Q. *Did he make a report to you?*
- A. He did, yes.
- Q. *Did you file that report just as it was, just as he wrote it?*
- A. I do not think I quite understand your meaning.
- Q. *What I mean is, did you edit his report before you filed it?*
- A. I did not.

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Q. *You filed it just as he wrote it?*

A. Exactly.

Q. *What I am trying to get at is whether we have in the filed matter his full report.*

A. Well, I do not know what you have in your filed matter. You mean your photostatic copy?

Q. *Yes.*

A. You have it all there. Of course, barring the possibility that something is gone from the report as handed in to Washington, it was in the original report that I handed in.

Q. *Well, that is what I wanted to get at, whether there was anything available on the subject. Your own experiments, as distinguished from those of Drs. Taylor and Long did not, I think, involve any chemical analysis of the blood, did they?*

A. They did not, no. That was delegated to Dr. Taylor's group of experiments.

Q. *Your own experiments apart from the others were not regarded by you or the Board as in themselves conclusive, were they?*

A. I think so, yes. Conclusive so far as the ground they pretended to cover.

Q. *Yes, but I meant conclusive on the answers to the questions presented?*

A. Not wholly, no.

Q. *I suppose that almost goes without saying, because otherwise it would have been unnecessary to have the others, that is true, is it not?*

A. That is true, yes.

Q. *Is it not true that injury might occur without being detected by the methods you employed?*

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A. I suppose it is possible, but not very probable, in my judgment.

Q. *And I think Dr. Taylor in his report made a statement substantially to that effect?*

A. He did, but I think you must also remember that Dr. Taylor was discussing the problem from the angle of excessive quantities beyond what would be consumed under any ordinary conditions of life.

Q. *Well, the statement that I had in mind was: "This does not exclude injury, since it is known that metabolism may be normally maintained under conditions of specific intoxication."*

You agree with that, do you not?

A. With some qualifications, yes.

Well, metabolism may go at the normal level possibly with certain lesions, but in such cases you would be very apt to find either in the examination of the blood, as we conducted it, in the examination of the urine, as we conducted that, the examination of the feces, as we conducted that, you would be very apt to find some hint, some suggestion that something was wrong.

Q. *You should be apt to, but it still is true that injury might occur without being detected by the methods you employed?*

A. It is possible.

Q. *To make clear the possibilities of that, is it not true that the ingestion of very minute traces of lead for a period of a year or more may give no indication of ill health, but if the ingestion is continued it will eventually lead to profound disturbances and end in death?*

A. I know no metabolic experiments with lead covering, say, 130 consecutive days, of dosing with small doses of lead on record, so I can not tell.

Q. *You do not think you could tell without specific knowledge of such experiments?*

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A. Why, no. I do not think so. I think if the excreta were collected daily with small doses of lead being given under definite conditions, that you might find some suggestions of trouble, if the experiment is continued a sufficient length of time, say three months.

Q. *Well, that is, if I understand you, Doctor, you might or might not?*

A. I can not say positively.

Q. *Now, you have referred to experiments for 130 days. During how much of that period were what you call "fairly large doses" fed?*

A. The experiments in question extended over 160 days. Aluminum salts or baking powder bread was given during 130 days; the first three months' period or exactly 90 days was devoted to what we call the smaller doses. In other words, it went up to the 150 milligram mark, as I recall, and then came, without any break, 40 days of the higher feeding in which we got up to 260 milligrams of aluminum per day, if I remember correctly.

Q. *Now, Doctor, you referred to Dr. Wells' criticism of the applicability of these experiments, based on the fact that you fed normal healthy men.*

In your opinion might there not be a very material difference between the effect of continued ingestion of food containing an astringent substance on healthy men on the one hand and, say, children or a person with an irritated gastro-intestinal tract on the other hand?

A. I should say not with children. With the individual having irritated gastro-intestinal tract one might expect a somewhat different result.

Q. *Well, why do you think there could be no difference between the healthy man and the child?*

A. Because there is nothing in the results which we obtained to suggest the possibility of any difference in action.

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- Q. *Healthy men eat many things without showing ill results that can not be fed to children, do they not?*
- A. Sometimes.
- Q. *Well, is not that a common experience in every family?*
- A. Yes, and the reverse is equally true.
- Q. *Well, then would it not necessarily follow that results obtained from feeding a substance only to healthy men would not preclude the possibility that the eating of that substance by children injured?*
- A. I do not think I can say that it would preclude the possibility but I should like to add that in my judgment there is no other way of carrying on such experiments as are called for in an inquiry of this kind than by using reasonably healthy individuals.
- Q. *Well, that is what I am getting at, if I may say so, are not you and Dr. Wells a little bit at cross purposes?*
- A. I should judge that we were, yes.
- Q. *In that you have taken his criticism which related to the applicability of these experiments as relating to the propriety of them?*
- A. I took his criticism to imply that our methods were of no use because we did not use a group of pathological patients.
- Q. *And do not you think what he really said was that your experiments did not go far enough to exhaust the facts or possible facts of feeding a substance to the American people generally?*
- A. Well, the only thing I can make to that is that so far as my knowledge goes there have been very few, if any, experiments along these directions where the period of time covered was as long as was covered here. I think I might add that finding of peculiar and possibly abnormal results with certain individuals would not preclude the use of that substance for mankind in general.

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We would not think, for example, of excluding the use of sugar because a diabetic can not take it.

Q. *And on the other hand the effect of sugar on a healthy man would not shed much light upon a person suffering from diabetes?*

A. No, not necessarily.

Q. *Now, the baking powder that you fed in your experiments were some that you made yourselves, was it?*

A. That we made ourselves in the laboratory.

Q. *And you used sodium aluminum sulphate?*

A. Sodium aluminum sulphate, calcined, that is with the water driven off.

Q. *Water of crystallization?*

A. Water of crystallization.

Q. *Where did you get it?*

A. Oh, I do not remember. I do not recall. It is fourteen years or more. I do not know whether I made any note or not. (Referring to papers) I can not say. I have not anything to refresh my memory with. Probably it was purchased from Calbaum's house or from Merk's house, I can not say.

Q. *Well now, to what extent did you or the Referee Board rely in reaching your conclusions on the non-absorption of aluminum or its compounds into the blood?*

A. Why, not to any very great degree, I think. We studied that. We studied the question from the standpoint of the presence in the urine. We studied it from the standpoint of presence in the feces.

Q. *Just a moment. Excuse my interrupting, but in that connection in your experiments did you have a chemical analysis of the urine made?*

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A. Oh, yes. That is, tested it.

Q. *Well, I meant chemical analysis for aluminum.*

A. No, not regularly. We looked for it once in a while.

Q. *Would your conclusions have been the same if you had found as a fact that aluminum contained in alum baking powder biscuits is regularly absorbed into the blood in small quantities and accumulates in various organs and tissues of the body?*

A. My impression is that we should have made additional experiments beyond those that we carried out.

Q. *Well, what I want to get at, Doctor, is this:*

Just assume that it was demonstrated beyond any doubt that aluminum contained in alum baking powder biscuits is regularly absorbed into the blood in small quantities and accumulates in the various portions and tissues of the body.

On that assumption would not you modify the opinion you expressed as one of the Board with respect to the harmlessness of aluminum?

A. I do not think I should. On the basis of what is implied in your statement. If that stood by itself it would have made me very cautious; it would have made me look for some additional facts if I could find any, because I was face to face, as the other members of the Committee were, with the fact that these subjects, and a good many of them, had been taking aluminum in large quantities for a relatively long period of time, and the medical men, Dr. Strengel of Philadelphia, Dr. Rand at New Haven, could not find any indications of anything at all wrong, so that the question of whether a small amount of aluminum getting into the blood and being deposited in the tissues, would have any harmful influence or not, would have to be looked into before being accepted at face value.

You see, aluminum is different from copper or mercury or lead. It has been used for years and years in large quan-

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tities and no results that I know of have ever been reported against it.

* * * * *

Q. Now, would you subscribe to a statement as put there:

"The aluminum itself has not been found to exert any deleterious action injurious to health beyond the production of occasional cholic when very large amounts have been ingested?"

A. I should subscribe to that, yes, sir.

Q. Would not all members of the Board subscribe to that?

A. I think so, yes.

Q. As a matter of fact, Doctor, is not what I have read a quotation from the report of the Board itself, which quotation is made in this Bulletin No. 103?

A. That is possible.

Q. It is not matter added by the Department of Agriculture?

A. Oh, no. I did not mean to imply that, sir. I simply meant that the phraseology in view of all that has been going on, is perhaps a little ambiguous, the word "aluminum," stead of qualifying it.

Q. On the other hand, some parts of this Bulletin No. 103 are distinctly the work of the Department of Agriculture not contained in the report of the Board; that is so, is it not?

A. Not so far as I know.

Q. You mean you think all this is in the report of the Board?

A. I think all the facts are in the report of the Board, the phraseology may be different.

Q. Well, the statements made in number 103 are certainly not all in the report of the Board, are they?

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A. Well, I can not say definitely off hand. I rather assume so. I assume from the statements on the heading "This is a contribution from the Referee Board of Consulting Scientific Experts, I. R. Remsen, Chairman, April 19th, 1914."

Q. *Well, surely you know whether or not, Doctor, this Bulletin No. 103 was written by the Board or the Department of Agriculture?*

A. Why, I said very distinctly that it was not written by the Board. I think that came out in my previous testimony in which I said that the small report of which I think you have a photostat copy was signed by all the members of the Board.

Q. *Yes.*

A. And I take it that this Bulletin No. 103 is based on that.

Q. *Based on it, but many of the statements in this bulletin were not in that report?*

A. That I meant to imply when I stated that this bulletin was not written by the Board, but came from the Department of Agriculture.

* * * * *

Q. *In Seims' experiment, may not the tartrate in combination with aluminum have been a factor in producing the reported injurious effect following the intravenous injection referred to?*

A. It is quite possible.

Q. *If it is a fact that the injection of common table salt in concentrated solution produces the injurious effect, and even death, would you conclude therefrom that any table salt is, as ordinarily understood, a poisonous substance?*

A. I should not.

MR. BROWNELL: That is all.

MR. COX: That is all.

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TESTIMONY, C. W. EDMUNDS

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C. W. EDMUNDS was thereupon called as a witness, and being duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. BROWNELL: *Q. Where do you reside, Mr. Edmunds?*

MR. MOORE: I would like to reserve my cross examination of this witness until some future date.

EXAMINER AVERILL: Let us see about the examination first and then talk about the cross-examination later. It may be very short.

BY MR. BROWNELL: *Q. Where do you reside, Dr. Edmunds?*

A. Ann Arbor, Michigan.

Q. What is your business?

A. I am Professor in the University of Michigan Medical School.

Q. How long have you been there?

A. I have been on the teaching staff of the University since 1902.

Q. Will you state briefly your training and experience?

A. I attended Indiana University for a year and then went to the University of Michigan as a student in 1897 and graduated in medicine in 1901 and took the Arts degree while I was doing some teaching work; I took the Arts degree in 1904; I was an interne in a hospital a year or over; I then became Assistant in Pharmacology for two years and an instructor in the Medical School, delivering a course of lectures in the same school in the College of Pharmacy; in 1905 I was head of the Department of Pharmacology; then I was made lecturer on Materia Medica and Therapeutics; I held

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that title for approximately two years and then was made Professor of Materia Medica and Therapeutics, which position I have since held. Of course, I have been away during the summers studying in various places, such as the Massachusetts General Hospital, Johns Hopkins Hospital at Baltimore, and I did some special work for the United States Government in the hygienic laboratory in Washington for two summers, and I also worked in London University College one summer. Do you want my present work?

Q. *Are you a member of any professional societies?*

A. Yes, some. I am a member of the American Medical Association, a member of the Council of Chemistry and Pharmacy of the American Medical Association; member of the Association of American Physicians; I am a member of the Society of Pharmacology and Experimental Therapeutics, of which I was President three years until last Christmas; I am a member of the Society of American Physiologists; I am a member of the Society of Biology and Experimental Medicine; a member of the National Research Council of Washington, and a member of the Committee of Revision of the United States Pharmacopeia from 1910 to 1920, and from 1920 to 1930, Chairman of one of the sub-committees.

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* * * * *

Q. *Supposing that you find certain results from exposing plants and lower forms of animal life to the action of a given substance, would you then conclude that the human organism would react in the same way to the same substance?*

A. Oh, no, it is too long a jump. Such results would be interesting and possibly suggestive, but you certainly would not draw any conclusions without very careful investigation of the substance on higher forms. It is extremely difficult to carry over from the lower forms, especially from the plants.

Q. *Now, Doctor Edmunds, will you state the general conclusions that you drew from your investigation concerning which you have testified?*

SWORN TESTIMONY

MR. MOORE: Conclusions as to what?

By MR. BROWNELL: *Q. General conclusions from his investigation as he has stated them from the paper which he has before him, as to the investigations which he made. Will you state your general conclusions; state what is shown in the literature about the use of aluminum cooking utensils and the possibility of injury to the health through their uses?*

MR. MOORE: This opinion is drawn from the literature?

THE WITNESS: Yes, the literature is overwhelmingly in favor of its being harmless.

By MR. BROWNELL: *Q. What does the literature show you with regard to the possibility that some of the aluminum may be dissolved in the cooking process?*

A. I think no doubt that study of the literature shows that a certain amount of the aluminum is taken off by the foods as cooked in aluminum vessels, but a study of these tables shows that it is in very minute amounts.

Q. And you conclude, do you, that even if small amounts of those utensils are dissolved in the cooking process, it is harmless?

A. I think so.

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TESTIMONY, C. W. EDMUNDS

EXAMINER AVERILL: *What we want to get at is, if the witness—for the witness to state why he included in this compilation the article by Stoklasa and the article by Lunge, and Austen, on page 30. That is what we are after, is it not?*

MR. BROWNELL: Yes.

EXAMINER AVERILL: *The witness will please confine himself to that phase of it, and state why he included that?*

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THE WITNESS: Stoklasa's article, as I explained twice before, was an article that went more or less directly to showing the presence of aluminum, and its importance, for instance, to plants. The whole article by Langworthy is, of course, showing that aluminum is present in vegetable products and animal products and natural waters, and as far as can be told from the compilation in the book by Langworthy and Austen, ANY FOODS THAT YOU TAKE WILL HAVE SOME ALUMINUM PRESENT IN THEM.

BY MR. BROWNELL: Q. *Now, what application did that statement have to the problem which you are considering?*

A. If we normally have—THAT WE NORMALLY TAKE IN SMALL AMOUNTS OF ALUMINUM WITHOUT ANY DANGER TO HEALTH.

BY EXAMINER AVERILL: Q. *And, therefore, as applied to your problem, the one which you are considering—you stated, that minute quantities of aluminum which were taken into the system, which were dissolved from cooking utensils, were no more harmful to the human body than the ordinary foods, is that the idea?*

A. It is negligible.

Q. *It is negligible. I mean, that was your reason for including it; that is what I am trying to get at?*

A. Yes.

TESTIMONY, ROBERT L. EMERSON, Former Assistant Chief, Bureau of Chemistry, Washington, D. C.

Q. *Food Inspection Decision 174 does not contain the word "alum" at all, does it?*

A. No, sir, not that I recall.

Q. *Then Food Inspection Decision 174 does not classify any baking powder as "alum" powder, but does classify some as containing aluminum compounds, isn't that correct?*

SWORN TESTIMONY

A. A technical reading of the word.

Q. *Or any reading of the word, isn't that true?*

A. Any reading of any word, or any settled word, it is always what you have in mind. I am only talking of the administration of the Food and Drug Act, and the classification of baking powders.

Q. *But this particular decision does not mean alum baking powders as such in any way, shape or form, does it?*

A. No, sir.

Q. *Wasn't that decision an announcement from the Bureau of Chemistry that baking powder which complied with the specifications, or standards therein mentioned was considered legal under the provisions of the Food and Drugs Act?*

A. Considered legal?

Q. *Yes.*

A. Those decisions were put out for the guidance of food and drug officials in administering the law; it so states.

Q. *So isn't it true that any baking powder which falls under the classification described in this decision is a legal product so far as it is concerned in this country?*

A. I am not a lawyer; I do not know what the use of the word "legal" means.

Q. *I will ask you another question; probably I am not making it clear, Doctor. This standard set up by Food Inspection Decision 174 has been approved by the Association of State Food Commissioners, wasn't it?*

A. By the Association of Official Agricultural Chemists.

Q. *It has been approved by the Association of Agricultural Chemists too, wasn't it?*

A. It so states.

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- Q. *Has it been approved by the state officials, the state food officials of Massachusetts?*
- A. By the Association of Dairy—by the American Dairy Food and Drug officials.
- Q. *How about the food officials of Massachusetts, do you know?*
- A. I don't know.
- Q. *You do know, however, that this standard as set up by this decision has been approved generally by State food officials, has it not?*
- A. Why, that Association of American Dairy Food and Drug officials was, ten years ago, an association of these officials.
- Q. *Does not that mean a baking powder which complies with the standard set up by this decision can be legally sold under the Federal Law or anywhere under state laws, where they have approved this decision?*
- A. I think that is a legal question I am not competent to pass upon, so far as I understand it.
- Q. *Well, you were the Assistant Chief of the Bureau of Chemistry, were you not?*
- A. Yes, sir; but what you can sell and what you can buy in this country, so far as it meets with the law, is any particular license that is granted by the Government under the Food and Drugs Act.
- Q. *But does not the publication of this standard furnish those officials with something to guide their action as to what baking powder should be?*
- A. Yes, sir; a description of what baking powder should be.
-

SWORN TESTIMONY

TESTIMONY, FRANK C. GEPHART, Consulting Chemist

FRANK C. GEPHART was thereupon called as a witness, and having been duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. BROWNELL: Q. *Where do you reside, Dr. Gephart?*

A. 16 Park Avenue.

Q. *What is your occupation?*

A. Chemist.

Q. *You have a laboratory here in the city?*

A. I do.

Q. *What is the character of your usual work?*

A. I am what is known among chemists as an analytical and consulting chemist and I work usually on manufacturing problems, nutritional work of all kinds.

Q. *And that involves, does it, a considerable amount of analytical work of all sorts?*

A. It does.

Q. *Will you give us a brief statement of your education and training, mentioning the various places in which you have worked?*

A. I graduated from the University of Kansas in 1906, receiving the degree of Bachelor of Arts, specializing, or taking a course and specializing in chemistry. I was awarded the Teaching Fellowship in chemistry at the University of Kansas upon my graduation and I held this Fellowship until the 1st of January, 1907, when I accepted a position as a research assistant to Dr. John H. Long, Professor of Physiological Chemistry of the Northwestern Chemical College at

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Chicago. I worked with Dr. Long from 1907 until late in 1911 when I came East and worked for a while at St. Luke's Hospital here in New York City with Dr. F. C. Wood, and later I was appointed chemist to the Russell Sage Institute of Pathology and was associated from 1912 to 1917 with Dr. Graham Lusk, head of the department of physiology of Cornell University Medical College of this city.

The work on the Russell Sage Institute of Pathology was being carried on in the laboratories of the department of physiology at Cornell University and while holding the position as chemist to the Russell Sage Institute of Pathology I was at the same time taking advanced courses in the chemistry of food and the science of nutrition, working towards the degree which I obtained in 1916, the degree of Doctor of Philosophy from Cornell University Medical College.

In 1917 I was made a captain of the Sanitary Corps of the Army office of the Surgeon General and was sent overseas. My chief duties as an officer of the army were work pertaining to nutrition of troops, and after the armistice I was associated with Mr. Hoover in some relief operations in the Balkans, that is, feeding children, chiefly in the New Kingdom of S. H. S., known also as Jugo-Slavia.

At the expiration of this work in 1920 I started out in business as a consulting chemist and now have an office and laboratory at 23 East 31st Street, this city.

* * * * *

- Q. *Have you made a study of the report of the Referee Board?*
- A. During my association with Dr. Long of the Northwestern Medical School, from 1907 to 1912, I had occasion to work with him as his chief assistant on this investigation of the health menace of aluminum compounds.

SWORN TESTIMONY

The investigation under the auspices of the so-called Referee Board of Consulting Scientific Experts. We investigated four or five different subjects and it happened that aluminum was one of the subjects investigated.

Q. *What part did you yourself have in this work?*

A. Well, as I say, I was Dr. Long's chief assistant. I had direct charge of the chemical work. The dietaries, feeding of the men, supervision over the analysis of what they excreted, and of course, I did a lot of work with Dr. Long on tabulations and summaries and working up his results.

Q. *Were these men under your personal observation?*

A. Yes. We had an apartment; we rented an apartment and the men all lived there and I lived at the apartment with them. I had them under my constant supervision from the day the experiment started until the day it ended. I lived with them and I saw them in the laboratories working every day. I weighed out the food which they ate; I administered the aluminum to them which was given to them, personally.

Q. *Doctor, have you read and studied the actual report made by the Referee Board?*

A. I have read and studied a photostatic copy of the report made by the Referee Board.

Q. *And as to the part of Dr. Long, you yourself took part in the preparation of that?*

A. Yes. I assisted Dr. Long in drawing up his report, not in its entirety, but we worked together on it. It was a big job and a lot of people worked on it and I was one of them.

Q. *And do you coincide with the findings which the Referee Board reported?*

A. I do.

Q. *Now, have you read bulletin number 103?*

A. I have.

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Q. *Of the Department of Agriculture?*

A. I have.

Q. *Do you also coincide in the conclusions set forth therein?*

A. Well, I do not know how to differentiate between the two, to tell you the truth.

Q. *In other words, in your opinion they are the same?*

A. I have never studied it critically with that point in mind, sir, of determining any difference between them. I noticed quoted in bulletin number 103 the conclusions of the Referee Board as submitted and those are the conclusions in which I concur.

* * * * *

EXAMINER AVERILL: *Well, this witness is an expert witness and I suppose he wants to read something there and he wants you to ask him something about his opinion or conclusion and if the bulletin is in evidence it can undoubtedly be taken as part of the literature.*

A. This note which you refer to and request me to read is as follows:

"We must not, however, be oblivious to the fact," says Dr. Taylor, who conducted part of this investigation, and this is quoted by the way, "That a saline cathartic residue results from the reaction of every form of known baking powder, now commonly employed. The use of cream of tartar or tartaric acid baking powder leaves in the alimentary tract a residue of tartrates which exhibit an action of a saline cathartic and diuresis (excessive excretion of urine as well).

"The so-called phosphate baking powder leaves as a residue of reaction sodium phosphate, again a saline cathartic and an aluminum baking powder leaves as a residue of reaction sodium sulphate, a saline cathartic.

SWORN TESTIMONY

"Apparently, however, at present at least, the use of baking powder is associated with the introduction into the alimentary tract of a certain amount of saline cathartic, the salt differing with the use of the particular type of baking powder."

TESTIMONY, PHILIP P. GRAY*

Q. *You then proceeded to analyze certain food products, did you not?*

A. I did.

Q. *What did you first analyze?*

A. We purchased various samples of milk. Sheffield Milk, Borden's Milk, Walker-Gordon Milk. In the case of Sheffield Milk we found 1.5 parts per million, of aluminum.

In the case of Borden's Milk we found 2.4 parts per million, and we also found 2.4 in the case of Walker-Gordon milk.

We also examined some butter in which we found 4.2 parts per million of aluminum. We also examined samples of whites and yolks of eggs. The egg was boiled and the yolk and white separated.

In one case a sample of white representing the whites of two eggs we found .2 parts per million. I might say that a result of that kind, the method is not fine enough to distinguish between .1 and .2 and .3 parts per million.

In the case of another sample of egg white representing the whites of two eggs we found .4 parts per million.

In the case of one sample of egg yolk representing two eggs we found 11.2 parts per million.

In the case of another egg yolk representing two eggs we found 2.2 parts per million.

*Consulting Chemist Pease Laboratories, New York City, N. Y.

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I then ran a further series of samples of egg yolk, 2.8, 3.5, 3.6, 3.6, 5.6 and 4.3, all on yolks of different eggs.

Q. *As parts per million?*

A. As parts per million of aluminum, and also in the case of the last six samples I combined the whites in this case and obtained .2 parts per million.

The examination of aluminum was also made in a sample of new potatoes which were purchased, in which we found 3.3 parts per million of aluminum.

I obtained a sample of whole wheat, that is, the grain, that is a whole grain and found 7.4 parts per million.

Q. *That was in one sample?*

A. That was the only sample of whole wheat I had. Oh, yes, I found 5.9 and 7.4, but that was on the same sample, duplicates.

In the case of yellow corn meal I found 9.7 and 11.2 parts per million.

In the case of water ground white corn meal I found 9.4 parts per million.

TESTIMONY, EDWIN A. HARRISS

EDWIN A. HARRISS was thereupon called as a witness, and having been duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. BROWNELL: Q. *What is your occupation?*

A. Vice President of the R. B. Davis Company, and member of the Executive Committee.

SWORN TESTIMONY

Q. *What is the business of the R. B. Davis Company?*

A. Manufacturer of baking powder.

Q. *Where is its office and plant located?*

A. 38 Jackson Street, Hoboken, New Jersey.

Q. *How long have you been an official of the R. B. Davis Company?*

A. I have been a Director of the R. B. Davis Company since 1911. I have been an officer of the R. B. Davis Company for three or four years; I have also been a member of the Executive Committee since 1911.

Q. *What is the general nature of the duties which your office requires you to perform?*

A. I am particularly interested in the manufacturing of baking powder, and as a member of the Executive Committee my duties are very general, dealing with all departments of the business.

Q. *You exercise general supervision over all the activities of the company?*

A. As a member of the Committee.

Q. *And especial attention to the details of production?*

A. That is correct.

Q. *Are you familiar with the general methods, both of manufacture and sale, of the product?*

A. I am.

Q. *What is the nature of the product manufactured by the R. B. Davis Company?*

A. What do you mean; as to the type of baking powder manufactured?

Q. *Yes.*

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- A. We manufacture a composite baking powder containing as its acid ingredients acid phosphate of calcium and sodium aluminum sulphate.

* * * * *

- Q. *I have here some cans that are labelled as if they were your products. Will you look at them and tell me if that is the way you have marked your baking powder and, to save time, I will say that I am merely referring to the ingredients clause.*

- A. That is correct. I will say that these appear to be authentic labels.

- Q. *Now I notice one of them reads:*

"Composed of specially prepared acid phosphate and bicarbonate of soda with corn starch as a preservative," whereas another reads: 'Specially prepared acid phosphate, bicarbonate of soda, sodium aluminum sulphate, corn starch and 15/100ths of one per cent dried white of egg. The dried white of egg furnishes a means of estimating the available gas and is not a substitute for eggs in cooking.'"

What is the explanation of the difference between these clauses?

- A. The can that you referred to as being labelled:

"Composed of specially prepared acid phosphate, bicarbonate of soda, and corn starch as a preservative," was packed, I think, in 1919,—no, 1909, and was shipped into a certain territory in which we were experimenting. We had so much resistance to overcome to this so-called alum controversy, that we decided to leave that ingredient out, that is, the sodium aluminum sulphate out of the baking powder and see if we could make a baking powder that would be satisfactory without it in order to decrease the sales resistance to a baking powder containing that material.

- Q. *What was the result of that experiment?*

- A. It was rather unhappy. We found that we could not produce as good a baking powder, so we changed back and made our standard formula.

SWORN TESTIMONY

TESTIMONY, CHARLES H. LA WALL

CHARLES H. LA WALL was thereupon called as a witness, and having been duly sworn, testified as follows :

DIRECT EXAMINATION

BY MR. REIGHARD: Q. *What is your residence?*

A. 437 South 44th Street, Philadelphia, Pennsylvania.

Q. *And what is your present occupation?*

A. Well, I am an analytical and consulting chemist. I am also the Dean of the Philadelphia College of Pharmacy and Science.

Q. *Will you give us a brief statement, please, of your education and experience?*

A. By birth and training and experience, I am a pharmacist. I was born in 1871, was educated in the public schools, including the High School of Bloomsburg, Pennsylvania. Was subsequently given a college preparatory course in the Bloomsburg State Normal School. Afterwards I went to Philadelphia and graduated in pharmacy at the Philadelphia College of Pharmacy and Science.

During the period from 1888 until 1893 I had served a regular term of apprenticeship in pharmacy, and had also spent a year or so in the retail drug trade for the purpose of being able to register as a pharmacist in the State of Pennsylvania.

In 1893 I became associated with a pharmaceutical concern in Philadelphia, the Smith, Kline & French Company, who were wholesalers and manufacturers as well. I was connected with various of their manufacturing departments, and also with their analytical department.

In 1900, still retaining my connection with the Smith, Kline & French Company, I became associated with the

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Philadelphia College of Pharmacy as an instructor in pharmacy.

In 1904 I gave up my connection with the Smith, Kline & French Company and became an analyst associated with a then very celebrated public analyst in Philadelphia, named Dr. Henry Lippman, to whose practice I succeeded in that same year.

Since 1904 I have been a consulting analyst in Philadelphia, and have been chemist for the Pure Food Department of the Department of Agriculture of the State of Pennsylvania, during which period I have handled more than 40,000 samples of foods.

I was also chemist for the United States Department of Agriculture, doing some special per diem work on drug importations from 1907 until 1912.

Since 1908 I have been chemist for the Pennsylvania State Board of Pharmacy, and from 1910 until 1916, I think it was, I was consulting chemist for the Pennsylvania State Health Department.

In 1905 I became Associate Professor of Pharmacy in the Philadelphia College of Pharmacy, and was then associated in pharmacopeia revision work, with my superior in the work at the college, Professor Joseph B. Remington, who was at that time Chairman of the Revision Committee of the United States Pharmacopeia. I was not officially connected with the work, but I was his assistant, and had a great deal to do with the detail work of the revision of that decade.

In 1910 I was elected a delegate to the United States Pharmacopeia Revision Convention, and was elected at that convention a member of the United States Pharmacopeia Revision Committee for that decade, at which time I was also elected Secretary of the Revision Committee and was given the responsibility of the Chairmanship of inorganic chemicals.

SWORN TESTIMONY

In 1918, at Professor "Remington's" death, I succeeded him as Professor of Pharmacy and Dean of the Philadelphia College of Pharmacy; and also temporarily succeeded him as Chairman of the United States Revision Committee of Pharmacopeia.

In 1920, at the Decennial Convention for Pharmacopeial Revision I was again elected a delegate and was again elected Secretary of the Committee of Revision, and was given the Chairmanship of the Committee on Reagents and Tests.

My work has been partly along food lines and partly along drug lines, in all of the years of my experience.

Q. *Will you tell us what the United States Pharmacopeia is?*

A. The United States Pharmacopeia is a book of standards for medicinal substances, primarily. It was instituted in 1820. It is the second oldest national pharmacopeia in the world, the only one older being the French Codex, which was instituted in 1818.

Since 1820 the United States Pharmacopeia has been revised every decennial, the present revision being the tenth revision, the revision which is now in process of preparation. The present official revision, however, is the ninth, which was published in 1916.

* * * * *

Q. *Has there ever been a time, to your knowledge, from your work with and under the United States Pharmacopeia, when druggists dispensed sodium aluminum sulphate as alum?*

A. Never.

Q. *Have you ever known of the use of sodium aluminum sulphate in medicine?*

A. Not of my own knowledge.

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Q. *Doctor, the purpose and tendency of scientific nomenclature is to differentiate between the several compounds making up a general group, is it not?*

A. Always.

Q. *The tendency being towards a specific rather than toward a generic use of the term?*

A. Yes.

Q. *Now, aluminum sulphate is defined in the United States Pharmacopeia, is it not?*

A. Aluminum sulphate?

Q. *Yes.*

A. I do not think aluminum sulphate is any longer recognized in the Pharmacopeia. I think that is in the National Formulary.

Q. *Well, will you refer to your book, please, and tell us where aluminum sulphate is listed anywhere, if at all?*

EXAMINER AVERILL: First see if it is listed in the Pharmacopeia.

A. It is not listed in the Pharmacopeia, but I happen to know it is in the National Formulary, because I am also a member of the National Formulary Revision Committee.

Q. *And do you know if it is listed in the National Formulary?*

A. Yes, it is.

Q. *Is it listed under the head of alum?*

A. No.

Q. *But would rather be under the S's or sulphates?*

A. No, it is rather under the title of aluminum. It could not be under the title of alum, because the Pharmacopeia already standardized alum, and it would not do to have a conflicting title or the same title for a different substance.

Q. *There are a number of substances listed in chemical literature under the title of alums, are there not?*

SWORN TESTIMONY

- A. Quite a number of them; yes, sir. Some of them do not even contain any aluminum.
- Q. *Now is it not proper and necessary in speaking of one of this general group of alums to specify what kind of alum you mean?*
- A. Well, if you want it defined, yes, but for some purposes I should say it would not make much difference. In water purification, for instance, where it depends upon a certain reaction which either of them give, it would not make such difference whether you meant soda, potash or ammonia.
- Q. *And if you came to a drug store and inquired for alum, you would get, under present conditions, ammonia alum?*
- A. You would, because that is the kind that is permitted by the druggist to be sold, and because it is the cheapest one at the present time.
- Q. *And in no case would the druggist supply sodium aluminum sulphate?*
- A. No, he would not know what it was.
-

TESTIMONY, EGBERT G. LEIGH

EGBERT G. LEIGH was called as a witness, and having been first duly sworn, was examined and testified as follows:

MR. BROWNELL: The witness, Mr. Leigh, whom the Commission now offers is called to show that Mr. Ziegler, the former president of the respondent company, purchased a controlling interest in the stock of the Southern Manufacturing Company, which was at the time producing and selling SAS baking powder. We expect to prove by other witnesses called later that the stock control of the Southern Manufacturing Company was held by Mr. Ziegler and by his estate for a number of years and during the time when the Royal Baking Powder Company was conducting its campaign against the SAS products. Without going

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further into the details of the evidence, I merely state that it is offered in rebuttal of the claim of the respondent that it has acted in good faith in its attacks upon SAS products. I am making this statement now so that if the respondent has objection to this line of testimony he can offer it now and get a ruling which will cover these witnesses.

MR. REIGHARD: Respondent does interpose an objection to the testimony as offered on the ground that it is immaterial and incompetent and does not bear on any of the issues in this proceeding. It is true that there has from time to time, perhaps, been some statement by counsel for the respondent upon the record in which the expression "good faith" was used in connection with the introduction of testimony which tended to prove the truth or the justification for the statements made by it, which statements are alleged by the Commission to have been false. The use of the expression "Good faith" in that connection I think is rather a loose use of the term, and I want to point out that there is a distinct line to be drawn between "good faith" which involves a question of motive or intent and the expression "justification" upon which the respondent relies as meaning that the statements or representations made by it have been in fact true or at least based upon authoritative scientific opinions at the time they are made, and it does not appear that the question of the motive or the intent of the respondent is in any way raised or could be raised in this proceeding. Further, I believe that it is true that the Mr. Ziegler referred to was never president of the Royal Baking Powder Company, and any testimony as to his actions as an individual cannot be binding upon this respondent.

EXAMINER AVERILL: Now, gentlemen, as far as the competency of the testimony is concerned, if it is based upon the question of its relevancy, I could not pass upon whether it is relevant or not relevant until we hear it. As far as the statement for the respondent that the Mr. Ziegler in question is not the Mr. Ziegler who was president of the Royal Baking Powder Company, of course that is a question for the proof to develop, but I do feel that while strictly speaking it may not be rebuttal of anything that has been put in directly on behalf of the respondent, yet I cannot help but feel that it is the question of honesty of intent in making statements that would possibly be very carefully scrutinized, not only by the Commission, but possibly by

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the courts, if the matter gets to the courts. Therefore, I would feel that it would be an error to exclude this evidence, and I will have to overrule the objection of counsel and permit counsel for the Commission to go ahead with his examination of the witness. After the close of the testimony of the witnesses, if it then appears that it is not relevant to this issue in any way, why counsel of course can make the motion to strike, which will be passed upon at that time. Go ahead, gentlemen.

MR. REIGHARD: I note an exception.

EXAMINER AVERILL: Exception.

DIRECT EXAMINATION

BY MR. BROWNELL: Q. *Where do you reside, Mr. Leigh?*

A. Richmond, Virginia.

Q. *Were you connected with the Southern Manufacturing Company here?*

A. Yes, sir.

Q. *In what capacity?*

A. President.

Q. *During what period were you president?*

A. I was elected president in 1901 and served for—oh, I was president before that. I was president at the time of the sale. I think I was elected president in 1891 or 1892. It is immaterial, I suppose.

Q. *You were president for several years?*

A. Yes, sir; I was president from that time on until 1906, from the time I was first elected.

Q. *What was the business of the Southern Manufacturing Company?*

A. They did a general business. They manufactured grits, ground corn and various specialties, but that part of it did

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not prove a success. We also roasted coffee then, but we finally came down to the manufacture of baking powder alone.

Q. *What character of baking powder did you make?*

A. Alum, as it is called. That was one of the ingredients.

Q. *What was the brand name?*

A. Good Luck.

Q. *And was the acid ingredient, sodium aluminum sulphate?*

A. I do not remember as to that.

EXAMINER AVERILL: He said it was what is called an alum baking powder. I think that is sufficient. You can bring it out at a later time if necessary.

Q. *To your knowledge did a Mr. William Ziegler own any stock in the company?*

A. Yes, sir.

MR. REIGHARD: I object to that question.

EXAMINER AVERILL: Objection overruled. Exception.

A. Must I go on?

EXAMINER AVERILL: Yes, please.

A. Yes, sir. Mr. Ziegler bought, I think, 366 shares, certainly more than a majority of the stock.

Q. *When did he obtain that?*

A. Well, there was nearly two months of negotiation, I think probably about the middle of May until the middle of July, when the sale was culminated, and by the way, it was consummated in the office of John M. Bowers, now dead.

Q. *What year was that?*

A. When it was consummated?

Q. *Yes.*

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A. 1901.

MR. REIGHARD: I would like to see that an objection is entered here to all of this testimony as secondary and not the best evidence. The stock books and stock records of the company should be produced to show the ownership of the stock at the particular time.

EXAMINER AVERILL: I understood, gentlemen, that the reason for making the statement in advance was that you could have a general objection to cover all the testimony of this witness, so as to prevent the interruptions after each question and answer, and a general objection is now noted on behalf of the counsel for the respondent to any and all of the testimony of this witness, not only the grounds already stated by counsel in the opening statement, but on the ground that it is not the best evidence, or portions of the evidence which have been given or will be given probably not being the best evidence, and this objection is overruled and an exception noted for counsel. This will cover all the evidence of this witness, so that we can get along with it.

BY MR. BROWNELL: Q. *In your capacity as president, did you come in contact with, Mr. Ziegler?*

A. Yes, and I came in contact with him on his invitation before any purchase was ever consummated or made.

Q. *And who was William Ziegler?*

A. He was—well, I do not know that he was ever a president of the company, or whether he was or not. I knew in a general way that he controlled the company and its policy. When I first came in contact with him a man named Rose was president of it.

Q. *Of what company?*

A. The Royal Baking Powder Company. Then a Mr. Gates was president of it at the time these transactions were had.

Q. *What connection did you understand Mr. Ziegler had with the Royal Baking Powder Company?*

A. I understood always that he had a controlling interest in it and dictated its policy. Now, I do not know what my tes-

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timony is worth on that, if anything. I never had access to the book of stockholders, but he talked as a man in authority and in control.

Q. *After Mr. Ziegler acquired the stock, did you stay on as president?*

A. Yes, sir. He made it a condition precedent, or they did, of the sale of it—shall I go on and make this statement?

Q. *Yes, please.*

A. They wanted me to agree to allow them to elect me president annually for five years and I did not want to be elected. We finally compromised on three years, but the treatment of me in every particular was without objection and I did stay five and then retired.

Q. *During that time did you have occasion to consult with any of the Royal Baking Powder officials?*

A. Yes, I would go to New York and talk with them.

Q. *Whom would you see in New York?*

A. Well, I saw Mr. Ziegler sometimes, and I saw Mr. Gates, who succeeded Mr. Rose as president. I know Mr. Gates is dead and I think Mr. Rose is.

Q. *And did you meet Mr. Ziegler in the Royal Baking Powder Company offices?*

A. I am not certain that I met him there, but I met him at his instance in his private office frequently.

Q. *During the discussions with Mr. Ziegler and with Mr. Gates would you talk over the policies to be pursued by the Southern Manufacturing Company?*

A. Yes, in a general way. They were very liberal in their treatment of me, and allowed me to proceed in my own way. They never sent anybody down here while I was president to look after anything.

Q. *During your time as president, did you note any advertising by the Royal Baking Powder Company in your territory?*

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A. I most assuredly did.

Q. *Averse to the use of alum powder?*

A. I most assuredly did.

Q. *What was that advertisement?*

A. Well, the substance of it was that we were selling poison and it was dangerous to health and ought to be prevented by law. It is very difficult to remember the wording. It was enough to be objectionable and not to stand for.

Q. *Where did those advertisements appear?*

A. Why, they had it all over the South, the territory that we did business in and in this city as well. I went to the proprietors of the papers here and got them to stop it, told them it was unjust.

Q. *Did you take any steps to get other proof concerning your powder to offset this advertising?*

A. I had got Austen from New York, now dead, and I forget his first name. He stood very well. He was a chemist and stood at the top of his profession, and was a man of exceptional ability in all directions. He was down here. He appeared before committees to testify about attacks of the Royal on behalf of various companies, I suppose.

Q. *Did you employ a Dr. Henry Froehling?*

A. Yes. He analyzed my powder, the powder of the Southern Manufacturing Company.

Q. *What did he report to you about it?*

A. Why, it was entirely free from anything deleterious to health, was the substance of his report.

Q. *Is Dr. Froehling alive yet?*

A. I thought he was dead, but someone told me in my office two or three days ago that he was still alive, but very old. His son, I think, succeeded him in business.

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Q. *Did you consult any physicians and get their opinions?*

A. Why, Dr. Hunter McGuire, the most eminent surgeon I presume that ever lived in the South, drew a bill which was introduced all over the country, and which was introduced in the Virginia legislature. Dr. McGuire wrote to one of the state senators from Richmond, Mr. Sands, a short note that he used this powder on his own table, because he knew it was pure. I must not be understood as repeating the exact language of a note I read a great many years ago. When I saw that I had it presented to the leading members of the profession here, a great number of them. No one refused to sign it, and probably fifty or sixty were invited to sign it, men in high standing in character as well as professionally.

Q. *So you feel, don't you, Mr. Leigh, that you were satisfied at least that your powder was perfectly healthy and harmless.*

A. Otherwise, I would not have sold it.

Q. *Did you ever discuss this matter with Mr. Ziegler or with Mr. Gates?*

A. I discussed it with Mr. Ziegler and Mr. Gates together and separately. The first interview I had with Mr. Ziegler. He sent for me and asked me to come to his office.

Q. *Did you protest against this advertising?*

A. After they bought it, it never occurred to me that the owners of a majority of the stock would make any further attacks and for that reason only the question was not raised in my discussion with them, but that appeared in one of the papers, an attack. I was justly offended. I was offended, whether justly or not. I wrote a letter more or less severe to the company.

BY EXAMINER AVERILL: Q. *To whom?*

A. The Royal Baking Powder Company.

Q. *To the Royal Baking Powder Company, or to Mr. Ziegler as an individual?*

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A. I wrote to the Royal Baking Powder Company. I remember talking with Mr. Ziegler about it. I wrote to the Royal Baking Powder Company of having read; that unless—this is the substance—that unless the objectionable advertisement was promptly withdrawn I would publish the facts of their ownership of the majority of the stock and ask the public to decide on the question of character between myself and them, I having introduced it and sold it upon the assurance of chemists of high standing that it was perfectly good and pure, and they having bought it afterwards as a matter of profit and to get rid of competition, and I said “I await your reply by wire before I publish your connection.” It was withdrawn.

Q. *Is that letter which you wrote still in existence?*

A. I could not tell you. I left the presidency of the company in July, 1906, and have had no connection with it since, and I do not know where any of the papers are, but that is a fact. I have no doubt that they have it in their records.

MR. BROWNELL: I might state for the record that a search made, as far as we can make it, shows that in all likelihood, this letter is destroyed, because other correspondence was.

BY MR. BROWNELL: Q. *What happened, Mr. Leigh? Did the advertising continue?*

A. No, sir, it did not, as to the name of this powder, “Good Luck.”

BY EXAMINER AVERILL: Q. *You mean this particular advertisement that you speak of?*

A. It was directed toward the Southern Manufacturing Company having sold a poisonous powder.

Q. *But I mean it named them?*

A. Named the Southern Manufacturing Company.

Q. *And named the powder?*

A. And named the powder.

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Q. *Oh, yes.*

A. I demanded it withdrawn and it was withdrawn.

BY MR. BROWNELL: Q. *And I think you mentioned that you spoke to Mr. Ziegler personally about the same subject?*

A. Oh, yes. I had frequent talks with Mr. Ziegler before the purchase and had talks with him after the purchase, and I remember—shall I go on and make this statement?

EXAMINER AVERILL: I think you might state what you did, but I do not think, Mr. Leigh, that you can state what the deceased said to you.

THE WITNESS: Yes, that is all right. I just simply am saying, then, that I did go there. I remember I went once at his either telegraphic or written letter request, to meet him in New York. That was some time after the purchase and I got there and Mr. Ziegler was not there. He had gone to his country place, and left a message for me to follow him. I declined to do it, on the ground that I had made my engagement to come to New York, and I did not intend to trot after him down to his farm; that if he wanted to see me he could come to Richmond. It struck great horror in the souls of the gentlemen in the office of the Royal Baking Powder Company, and they tried to dissuade me, but it was not my idea of keeping an engagement, or that his failure to keep his engagement with me created one on my part to hunt him up. So I refused to do it.

BY MR. BROWNELL: Q. *Will you tell us, Mr. Leigh, if you can, from whom Mr. Ziegler purchased his stock in the Southern Manufacturing Company?*

A. He purchased it from me. At that time, there were only two other stockholders, if I recollect it. One was Mr. Junius Morris and the other Mr. E. A. Saunders, and I sold their stock, having power of attorney to do so at the time, or I bought it from them and sold it.

Q. *Now in your conference with the officials of the Royal Baking Powder Company, I think you told us that you discussed thoroughly your policies?*

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A. Yes.

Q. *Did you not also discuss the financial condition of the company and its progress and its sales?*

A. Not specially, because he knew the financial condition was all right. It owed no money, paid cash for everything and always had a very comfortable balance in the bank—I mean at that time, before they ever bought it.

Q. *Well, were those officials kept informed of the general business of the company, so far as you know?*

A. Well, I made no written reports to them or anything of the sort. When I went to New York I would drop in and tell them how things were going on. They were very considerate. They never interfered in any way. Of course they would get a notice of the annual meetings. Miss Vincent, they had somebody down here, didn't they—Mr. Gary at these meetings.

MISS VINCENT: Yes, sir.

THE WITNESS: He was employed by the Royal Baking Powder Company.

MR. BROWNELL: You may cross examine.

BY EXAMINER AVERILL: Q. *Do you recall about what year the Southern began making the baking powders? You have told us that at one time they were engaged in the coffee and perhaps the manufacture of gifts and things of that kind, but I do not recall that you stated about when it was that they started to make the baking powders.*

A. I think the baking powder was a part of the business from the beginning.

Q. *Oh, you do?*

A. I think so.

Q. *I see.*

A. If not, very early in the beginning.

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- Q. *They were making the baking powder when you went in as president?*
- A. Oh, yes. The "Good Luck" I think I introduced afterwards. They were making a high priced powder and it did not take or we did not have capital enough to operate it, and I took this cheaper powder and named it "Good Luck."
- Q. *So you introduced the "Good Luck"?*
- A. Yes, sir.
- Q. *And it was after the "Good Luck" had been introduced that Mr. Ziegler bought an interest in the Southern Manufacturing Company?*
- A. The whole money of the company, its whole success was based upon sales of that powder, and was at the time of the purchase.

CROSS EXAMINATION

- BY MR. REIGHARD: Q. *Mr. Leigh, you say this contract for the purchase of 366 shares of stock in the company was made by you—with whom?*
- A. Well, the preliminary talks were with Mr. Ziegler. At the time of its consummation he was not present.
- Q. *When was that, about 1901?*
- A. It was 1901 and I think the whole thing was concluded about the 15th or 16th of July and that check was given.
- Q. *Who gave the check?*
- A. Mr. Rose was one of the men who was the former president. He had been in all the negotiations, and I think Mr. Gates was present.
- BY EXAMINER AVERILL: Q. *Did you say present or president?*
- A. Present and president, both. He succeeded Mr. Rose. It was consummated in the office of Mr. John M. Bowers.

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BY MR. REIGHARD: *Q. The contract then for the sale by you of this stock was not made directly with Mr. Ziegler?*

A. No, it was not. The preliminary talks were all with him, in which we discussed that—and in which they discussed buying it.

Q. Did Mr. Ziegler or Mr. Gates either of them authorize your employment of Dr. Austen, Dr. Froehling and these other chemists?

A. They had nothing to do with it. It was prior to their having an interest that I was consulting them on that.

Q. Those men were all consulted prior to 1901?

A. These men were prior to the sale. I expected no attacks after the sale from the Royal Baking Powder Company. They did it and I did not need any chemists to stop it that time. A simple letter produced the results.

Q. How many times during a year would you have occasion to consult with Mr. Gates?

A. Oh, it is very difficult for me to say. I used to go to New York frequently in those days. I had other business there besides this, and I expect I saw them sometimes twice a month and sometimes once a month. It was altogether a matter of my own convenience very much.

Q. Do you know in whose name the 366 shares of stock was issued and stood after the contract—

A. (Interposing) After the sale?

Q. After the sale.

A. I could not say at this time. I expect Mr. Laird remembers. He was secretary of the company at that time. Can I ask him a question?

EXAMINER AVERILL: You may refresh your recollection off the record and then testify to it after refreshing your recollection.

(The witness thereupon conferred with Mr. Laird, a gentleman present in the hearing room.)

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EXAMINER AVERILL: If that has refreshed your recollections, so that you can state with definiteness, you may do so.

THE WITNESS: I cannot swear to it, but I think it was Mr. Peters.

BY EXAMINER AVERILL: Q. *You thought it was Mr. Peters, and later you think it was in the name of whom?*

A. Mr. Sumner White. I do not remember the subsequent proceedings. Maybe it was after I left.

BY MR. REIGHARD: Q. *In your preliminary conversations with Mr. Ziegler about the purchase of this stock, did you discuss the matter of Mr. Ziegler's plans in reference to the future operations of the company?*

A. The substance of our discussions was what should be paid for it.

Q. *Incidental to that, was there any discussion?*

A. That was distinctly—it was a question of purchasing in all my discussions with him. It was my purpose to get out afterwards, but they made it a condition precedent that I would remain so many years.

Q. *After the purchase of the stock by Mr. Ziegler or Mr. Rose, did you have any discussions with respect to any change in the policy of the company or the operations?*

A. No. In all of those discussions he was the court of last resort. If it came to a question of policy or anything like that I saw him, but he just told me to go on and continue to do what I thought best for the company, what I thought best for the stockholders. I cannot remember the language at all.

Q. *Did you ever discuss with him any matters pertaining to a change in the name of the baking powder which was to be manufactured?*

A. I do not remember it, but I have an idea that he discussed with me not getting rid of the "Good Luck" brand which

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had been exhibited all over the South, but adding and introducing a phosphate powder that would pay a higher profit—not as a substitute for the other, but because it would pay a better profit afterwards.

MR. REIGHARD: That is all.

(Witness excused.)

TESTIMONY, GEORGE W. LORD

GEORGE W. LORD was thereupon called as a witness, and having been duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. BROWNELL: Q. *What is your position?*

A. Manager of the prescription department of Liggetts, 200 Broadway.

Q. *How many stores has the Liggett Company, approximately?*

A. I think they have about 260 at the present time in this country, and a number across.

Q. *They are all drug stores, are they not?*

A. Yes, sir.

Q. *As manager of the prescription department, do you have charge of the drugs that are being dispensed in the stores?*

A. Yes, sir.

Q. *What guide do you have, Mr. Lord, as to what drugs are sold under a particular term? Do you have an official guide of what you must dispense?*

A. In prescription use?

Q. Yes.

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A. Yes, we recognize the U. S. P. (United States Pharmacopoeia.)

Q. *You have had a number of years of experience in that work?*

A. Yes, sir.

Q. *What is sold in the Liggett Stores under prescriptions which call for alum?*

A. Ammonia alum, unless the prescription calls for potassium alum.

Q. *It is always one of those two substances?*

A. One of those two, yes, sir.

Q. *Have you ever filled a prescription calling for alum with sodium aluminum sulphate, SAS?*

A. No, sir.

TESTIMONY, H. A. McGUIGAN, Professor of Pharmacology and Therapeutics at the University of Illinois, College of Medicine.

H. A. McGUIGAN was called as a witness, and having been duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. BROWNELL: Q. *State your name, please, Doctor?*

A. H. A. McGuigan.

Q. *Where do you reside?*

A. I live in Evanston, Illinois.

Q. *What is your occupation?*

A. I am a Professor of Pharmacology and Therapeutics at the University of Illinois, College of Medicine.

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Q. *Will you give us a brief statement of your education and training and experience?*

A. I am a graduate of the Agricultural College of North Dakota, course in Science; graduate of the University of Chicago, Ph. D., Physiological Chemistry; Doctor of Medicine from Rush Medical College; I studied some time at the University of Michigan; and I was for a year in Heidelberg, with Professor Kossel and Gottlieb in pharmacological and physiological chemistry.

For a period of about five years I was Assistant Professor of Chemistry in the North Dakota Agricultural College and Experiment Station. During that time, though, I was away a year at the University of Michigan, and for about half a year in the Bureau of Chemistry.

From 1903 to 1906 I was Assistant in Physiological Chemistry at the University of Chicago. From 1908 to 1910, I was Assistant Professor of Pharmacology at Washington University, in St. Louis.

From 1910 to 1917 I was Professor of Pharmacology at the Northwestern University, Medical School.

From 1917 to the present I have been with the University of Illinois.

Q. *Are you a member of any professional societies?*

A. Yes. I am a member of the American Medical Society, American Society of Biological Chemists; American Society of Pharmacology and Experimental Therapeutics; American Society of Physiology; American College of Physicians; Institute of Medicine of Chicago; and have been a Fellow of the American Medical Association, but I am not now.

Q. *Have you written any books?*

A. Yes, I have written two books: one on Experimental Pharmacology and another on Chemical Pharmacology.

Q. *In your present work, what are the nature of your duties?*

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A. In my present work, my duties are teaching medical students pharmacology and therapeutics; and investigative work.

Q. *Have you, in the course of your investigations, done any work on aluminum compounds and aluminum salts?*

A. Yes.

Q. *How did you become interested in that line of work?*

A. Well, I came to Chicago—I came there because I was interested in the reactions of drugs on living matter. I had been working in North Dakota on the analysis of foods and studying the effects of foods on life, and I came there to continue the study. Doctor Matthews was working along much the same lines. The first problem I worked on there was the relation between the action of salts, acids and bases, on fermentation; and amongst those substances was aluminum.

* * * * *

Q. *So, if I understand you, you feel while it is probable that Dr. Ball found aluminum in his residues, you have doubts as to his quantities?*

A. Quantities, yes. I think it is the best work you could get to support the conclusions of the Referee Board on baking powders, as much even as their own work.

Q. *Will you explain that further, doctor?*

A. Well, the same amounts. If we grant that everything is here just as represented, if we accept those amounts, it would have no physiological effect whatsoever in the body.

Q. *Why do you say that?*

A. The amount is too small.

Q. *What have you to say concerning Doctor Ball's conclusions as to the presence of aluminum in the ferratin of the liver?*

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A. Doctor Ball deals with this, I think, very judiciously, very sanely. He states that its course through the body may take the same course that the iron does. I would expect that from the similarity, chemically, of iron and aluminum. It would go through the body I should expect much in the same way that iron does, and it would be taken care of by the same methods.

Q. *That is, provided it was absorbed at all?*

A. Yes, if it got into the body.

Q. *And when you say it probably takes the same course as iron, do you refer to the cases of iron that is being used in the body?*

A. Yes.

Q. *I mean the storage of iron?*

A. Storage of iron; and it might unite with proteins as iron does, and there might be a trace as a normal constituent wherever the iron is found.

Q. *Is there any harm in that?*

A. None whatsoever.

Q. *Let us ask you again concerning this experiment question, the question I asked you concerning the other—what applicability have these results to the question of the alleged deleterious effects of so-called alum baking powder foods on man.*

A. Well, I think it goes to show that alum used in this way has no deleterious effect.

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Q. *In your opinion can this comparison of aluminum lead, arsenic and mercury properly be made?*

A. No, this is really an invidious comparison. There is no resemblance, scarcely any. For instance, lead, mercury and iron are three of the most easily, quickly absorbable metals

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if you get them into the body, or the salts of them, while aluminum is one of the least absorbable metals, or its salts, at least, are least absorbable.

Again, poison from the three metals, lead, arsenic and mercury is exceedingly common. I see some cases, perhaps, of lead poisoning every week. I do not see many cases altogether, but I saw some a week from today. For instance, a week ago I saw a case of lead poisoning. I have never heard of a case of aluminum poisoning, but we see all the others.

Now, for instance, lead and arsenic poisoning used to be very common from wall paper where the paper contained it, and the literature is full of such cases of poisoning.

Makers of barometers and thermometers who work with the metal themselves, and also with mercury, they become poisoned with it. Plumbers, and other workers with lead, handling the lead pipe may get poisoned from it, but with metal aluminum no one has ever been poisoned, so far as I know, or no one has ever been reported poisoned from it.

For instance, in the manufacture of mercury, it is so poisonous that the lives of the workmen—not only the lives of the workmen, but also the people in the vicinity of the smelters are poisoned with it.

No such thing ever happened with aluminum, at least no one has ever heard of it.

Now again, for instance, aluminum utensils are very widely used in cooking. It is practically safe to say that most every house has some aluminum vessel, yet in no case has aluminum poisoning been reported.

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Q. *Now, generally, Doctor McGuigan, would you be surprised if you found traces of aluminum in the ordinary blood of human beings?*

A. No. In fact, I really think it is there in minute amount.

Q. *Why do you think that?*

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- A. Because it is so universally distributed, so constantly in contact with the body and it would be a surprise if it is not there in small amounts. I think the surprising thing is that we find it so frequently. The best work on that which I have yet seen is Bols. He is of the opinion that if we had more refined methods, we could find aluminum in all cells, which may be correct.

* * * * *

- Q. *Well, you have offered yourself here as a witness and you have stated in your direct examination your opinion that the public generally could eat food prepared with sodium aluminum sulphate baking powders without injury.*

- A. Yes, from the evidence.

- Q. *Now, I ask you again, am I to understand that in your opinion the human body can go on protecting itself against a substance which it does not utilize and you say is not a food, sodium aluminum sulphate, without placing a burden upon it?*

- A. In my opinion it can go on—

- Q. *Yes or no?*

- A. In my opinion it can go on eating the foods containing sodium aluminum sulphate indefinitely without injury.

- Q. *Without any injury whatsoever?*

- A. Yes, sir.

* * * * *

- Q. *Did not you say a few minutes ago that sodium aluminum sulphate was not a food?*

- A. It is not a food.

- Q. *Well, are not you proposing to introduce it into the human body as non-utilizable, is not that what you say about saccharine?*

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- A. It makes the ordinary food taste better and you cannot replace it by anything that would take its place and do just as well or better.
- Q. *You mean to say that there is no substance that could be substituted for sodium aluminum sulphate even though sodium aluminum sulphate is not harmless?*
- A. Nothing any less harmful.
- Q. *And that is your best reason for recommending the continuance of the use of sodium aluminum sulphate?*
- A. Yes.
- Q. *Do you consider the phosphates as harmful as aluminum?*
- A. Probably they are. I do not know sufficiently about them, but the Referee Board said they were.
- Q. *And you would not substitute the phosphates for sodium aluminum sulphate?*
- A. You might.

* * * * *

- Q. *Counsel has called your attention, by numerous questions, to the disposal of parts of foods which are not directly utilized by the body.*
- I would like to ask you one or two questions on that point. Is not it true that most foods do contain some part which the body does not utilize?
- A. Yes. I think all foods do.
- Q. *Is not it then a further fact that there are many things which the body is called upon to combat and that this fight of the body is a natural and normal function for which the body is well prepared?*
- A. Yes, and which the body needs in many cases. For instance, chemists often talk of preparing food that you can carry around in your vest pocket.

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Now, such a food would be utterly harmful. The intestinal tract needs training just as any other part of the body needs training and a certain amount of roughage is beneficial, is necessary.

Now, when I say that, of course, I do not mean that a football man in training or anything should go out and tackle a steam engine in order to get into practice, but a certain amount of exercise is necessary for the normal functioning of all organs.

Q. *So that the normal combat of the body against the non-utilizable parts of ordinary food is not only a normal function, but in a sense a beneficial function?*

A. Yes.

Q. *Well, would you condemn a natural food which contains an ingredient in small non-poisonous quantities because that ingredient in large quantities is poisonous?*

A. No, no, absolutely not.

Q. *In fact, is not it further true that almost any ordinary substance if taken in large enough quantities may be bad for the health?*

A. It has been estimated even by Dr. Geis and others that water, sugar, or even meat may be harmful. Any food may be, in large amounts.

MR. BROWNELL: That is all.

TESTIMONY, LAFAYETTE B. MENDEL

LAFAYETTE B. MENDEL was thereupon called as a witness, and having been duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. BROWNELL: Q. *Where do you reside, Dr. Mendel?*

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A. New Haven, Connecticut.

Q. *What is your occupation?*

A. I am Professor of Physiological Chemistry in Yale University.

Q. *Will you give us a brief statement of your education, training and experience?*

A. I am a graduate of Yale University in the Academic Department and a Doctor of Philosophy from Yale University in the year 1893. I subsequently became an assistant professor and professor in turn in that institution in the department of Physiological Chemistry, so that I have been associated with that department since my graduation from the University, with the exception of during the years 1895 and 1896, when I was a student and research worker in the German Universities of Breslau and Freiburg.

That is my academic career.

Q. *Are you a member of professional associations and societies?*

A. I am a member of a number of professional societies that are related to my own fields of research: The American Physiological Society, American Chemical Society and the American Society of Biological Chemists, and the American Society of Pharmacologists. The American Home Economics Association and a number of others, including the National Academy of Sciences.

I am also a member of the Council on Pharmacy and Chemistry of the American Medical Association.

Q. *Have you published some books and articles in your professional capacity?*

A. Yes.

Q. *How extensively have you done that?*

A. I have published a book on Nutrition and some smaller monographs on nutrition and a considerable number of

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papers representing the result of my investigations in the field of nutrition, physiological chemistry and allied subjects.

Q. *Have you had a considerable experience in nutrition work using rats and other animals as experimental subjects?*

A. I have been engaged in the study of nutrition more or less continuously since my graduate student days, as that has become my major field of scientific interest. It happens that I have been interested in the study of those phases of nutrition where rats are employed as experimental animals for a good many years, continuously since about 1910, so that in that direction I think I have had a rather unusual experience.

* * * * *

Q. *Did you, in Respondent's testimony which you studied, find any evidence which in your opinion would warrant the statement that the aluminum baking powder was deleterious to health?*

A. No, if you refer to the kind of powders that were used in these experiments.

Q. *Yes. Did you find in the Respondent's testimony which you studied any evidence which in your judgment would warrant the statement that the so-called alum baking powder had shriveled up the stomach of the animals fed?*

A. No.

TESTIMONY, VICTOR C. MYERS

VICTOR C. MYERS was thereupon called as a witness, and having been duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. BROWNELL: Q. *Where do you reside, Dr. Myers?*

A. Iowa City.

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Q. *What is your occupation?*

A. I am Professor of Biochemistry, State University of Iowa, and Pathological Chemist to the University Hospital, State University of Iowa.

Q. *Will you give us a brief statement of your education and training in your profession?*

A. I took my B.A. degree and my Master of Arts degree at Wesleyan University, Middletown, Connecticut, and there came under Professor Atwater and Professor F. G. Benedict; and later on was awarded a Fellowship at Yale University and took my Ph.D. degree at Yale under Professor Chittenden and Professor Mendel.

In 1909 I was appointed Adjunct Professor of Physiological Chemistry at the Albany Medical College, Medical Department of Union University, and in 1911 I came to the New York Post Graduate Medical School and was associated with that institution from 1911 until September of the present year. When I left there I was Professor and Director of the Department of Biochemistry.

Q. *What has been the general character of your work during these years?*

A. My chief interest has been along the line of pathological chemistry and I, during the past ten years, have devoted a great deal of attention to the chemical examination of the blood, particularly in pathological conditions.

Q. *Can you give us some idea of how many blood samples you have analyzed during that time?*

A. I should estimate that I had analyzed and directed the analysis of at least 25,000 specimens.

Q. *Are you a member of any professional societies and associations?*

A. I am a member of the Society of Biological Chemists and secretary of that organization from 1909 until the present year. I am Councillor now. I am a member of the Society

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for Experimental Work in Medicine, and was secretary and editor of the proceedings until I moved from the city. I am a member of the American Physiological Society. I am a member of the American Gastro-Enterological Association. I am a Fellow of the American Association for the Advancement of Science and Associate Fellow of the New York Academy of Medicine and the American Medical Association; and a number of other scientific societies.

Q. *How did you become interested in this present proceeding?*

A. I have had some interest in this problem of baking powders for quite a long time, that is, through my contact with Dr. Smith and through reading the various publications that emanated from Dr. Geis' Laboratory and I knew something about the report of the Referee Board. I was in New Haven at the time that the first Referee Board investigations were carried out and I have followed that work through their different investigations.

* * * * *

Q. *And based on your previous work and on your knowledge do you feel that the possible divergence of phosphates which may be caused by aluminized food would have no appreciable effect on the human body?*

A. I do not see why it should have any appreciable effect. Of course, I can conceive if an individual or an animal were put upon a very low phosphorus intake, as has been done by Sherman and Pappenheimer and then you give them this aluminized food, that you could lower the phosphorus absorbed to a point where such animals might be subject to rickets, but I do not think those conditions would have existed in the human subject.

Q. *Several preceding witnesses, including Dr. Wells and Mr. Himebaugh have testified to the effects which they noted of solutions of aluminum salts upon unicellular bodies and upon blood corpuscles which were taken out of their plasma.*

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What have you to say of the applicability of results from such experiments to the question of the effect of the ingestion of aluminized foods in the normal body?

MR. COX: Now, just a moment. I think that that question is not justified by the testimony. I do not know whether the witness is supposed to have read the testimony, but it seems to me that the question proceeds on facts which are not those of the experiments to which the question purports to refer.

MR. BROWNELL: Well, if not, I certainly want to be corrected, because I have no intention of misrepresenting the evidence.

MR. COX: Well, has this witness read the testimony?

THE WITNESS: I have.

EXAMINER AVERILL: Read the question, please.

(The question referred to was thereupon repeated by the reporter as above recorded.)

MR. COX: Now, I do not want any mystery about this. My only point is that if he is limiting to that part of the experiments which is strictly covered by the question that is all right, but that is only part of the experiments that they performed and testified to.

MR. BROWNELL: Well, that is perfectly true. I want the answer to the question just as it stands and not to any other part.

EXAMINER AVERILL: All right, gentlemen, go ahead and answer the question.

(The question was thereupon repeated by the reporter as above recorded.)

- A. In the first place I am not convinced of the presence of aluminum in the blood of individuals or animals that have partaken of so-called aluminized bread and unless it can be shown more conclusively that aluminum is present, why, I would regard this work as irrelevant. If it might be assumed that traces of aluminum are absorbed, it is perfectly

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possible that this aluminum would be combined with proteins in colloidal form; that would probably have very little influence.

As regards another point in their work, as I recall the testimony, very little was said about the closely related element iron. If it can be shown that iron in salts of chloride or iron alum has no influence such as is exerted by sodium aluminum sulphate, why, their evidence would carry a very great deal more weight with me than it does as it is. Iron is a normal blood constituent.

Q. *And if iron is as toxic or more toxic than aluminum, what would you conclude?*

A. I would conclude that these experiments had no bearing upon the question at issue.

Q. *What have you to say concerning the applicability of results of exposing muscle tissue, naked tissue, to the direct influence of aluminum solutions to the question of the effect of the ingestion of aluminized foods in the human body?*

A. I do not believe I see a direct connection.

Q. *Would your opinion in general be the same as you have expressed concerning the experiments on single cells and corpuscles taken out of the plasma?*

A. I think in that case I might under certain conditions express a little different opinion on the uni cellular than I would with the multi cellular. They have less means of defense than multi cellular.

Q. *If it is not shown that aluminum is in the human body in the amounts which were used in preparing an aluminum solution in which the naked tissue was immersed, could you in your opinion properly apply the results of the experiment with the naked tissue to the ordinary conditions of the human body?*

A. No, you could not.

Q. *What have you to say concerning the applicability of the results of experiments done by injecting solutions of aluminum*

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to the question of the effects of the ingestion of aluminized food?

- A. It seems to me that these are unnatural conditions. If I may draw a parallel: the peas, ordinary garden peas will agglutinate the red blood cells, but in much lower concentration than has been noted in the case of aluminum salts. Nevertheless it has occurred, but nobody ever heard of any difficulty, or it is very seldom certainly at any rate that any difficulty would occur from the consumption of peas, for the peas are ordinarily consumed in the cooked form. It is the uncooked form that produces this condition.

But there is a very great difference between a substance introduced by mouth and being ingested directly into the circulation.

Cane sugar, for example, is re-excreted in the urine, when given intravenously. It has to be broken down into glucose and levulose before it can be absorbed.

The ricin of the castor bean is a very poisonous protein and a few milligrams rubbed in at the abrasion of the skin will produce disastrous results, but if taken by mouth it is digested the same way as any other protein. Unless there happened to be an abrasion somewhere in the upper alimentary tract.

TESTIMONY, ANDREW J. PATTEN

ANDREW J. PATTEN called as a witness, and having been duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. BROWNELL: Q. *What is your name?*

A. Andrew J. Patten.

SWORN TESTIMONY

Q. *Where do you live, Doctor?*

A. Lansing, Michigan.

Q. *What is your occupation?*

A. Chemist. I am Chief Chemist for the Michigan Agricultural Experiment Station.

Q. *Will you give us a brief statement of your training and experience?*

A. I was graduated from the University of Maine in 1897. I was for three years connected with the Maine Experiment Station and five years at the New York State Experiment Station at Geneva, N. Y. During one year of that time I studied at the University of Heidelberg, Germany, and since 1905 I have been chemist for the Michigan Experiment Station.

Q. *Have you had any special experience concerning the methods for determining aluminum in a compound?*

A. For several years I guess, for five or six years, I have been acting as referee of methods of analysis for plant constituents, inorganic constituents of plant materials, for the Association of Official Agricultural Chemists. That is work which has to do with the development of analysis. One of the chief problems in connection with that work has been the examination of iron and aluminum in the presence of a large amount of phosphates, such as the ash of seeds, and in fact almost any agricultural material. That has been one of the problems that I have been interested in and working on during this time.

* * * * *

Q. *Now, in the course of your work in finding a method, you have experimented with a number of substances in solutions of aluminum, haven't you?*

A Yes, sir.

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Q. *From your experience would you expect to find on a final, very careful analysis of a considerable quantity of any substance, an aluminum present or not?*

A. I do not know as I get you exactly.

Q. *Maybe I didn't put the question very clearly. From all your work in this regard, if you are analyzing a considerable quantity of any sort of material, would you expect to find aluminum present in minute quantities, perhaps, but present, or the entire absence of aluminum?*

A. I would expect to find aluminum in almost any product. I know it is present in all agricultural products, and it is so intimately associated with iron and manganese, and titanium, that I would expect to find traces of aluminum wherever I would find iron.

MR. BROWNELL: You may cross examine.

EXAMINER AVERILL: *Doctor, do I understand, then, that in the quality of tests, you would expect to be able to determine whether there was or was not any aluminum present, but that the difficulty would be, the difficulty that would be experienced would be in the quantity of the test, is that right?*

A. Yes, the difficulty is in separating all of the other elements entirely out of the aluminum, that is getting the aluminum free from all other contaminative elements like iron, calcium, and manganese.

EXAMINER AVERILL: *Well, wouldn't that be the quantity?*

THE WITNESS: Yes. I say that is the quantitative difficulty.

EXAMINER AVERILL: In other words, the difficulty is not in discovering there is aluminum present, but in discovering the amount of aluminum that is present.

THE WITNESS: Yes.

EXAMINER AVERILL: *Is that the idea?*

THE WITNESS: Yes.

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EXAMINER AVERILL: *That is all I have to ask, gentlemen. I wanted to be sure where the difficulty was.*

MR. BROWNELL: Just one more question.

EXAMINER AVERILL: All right.

BY MR. BROWNELL: *Q. You would have to perform quantitative tests on a minute residue before you would know there was aluminum there at all, would you not?*

A. Well, to be absolutely certain, yes.

CROSS EXAMINATION

BY MR. REIGHARD: *Q. What specific agricultural products have you yourself tested for aluminum?*

A. I have tested wheats, oats, beans, and clovers, alfalfas and in my laboratory there has been various others—I can not name them all now, but grasses and so forth.

Q. What parts of these products have you tested?

A. I have tested the seeds of wheat and oats and so forth, the whole plant of clover and alfalfa. I presume we have tested oat-straw and wheat-straw and corn-stalks.

Q. How much aluminum did you find in the seeds of the wheat?

A. Why, I cannot tell you exactly offhand, because I haven't the figures with me, but it is my impression we had runs under a tenth of one per cent. Now, that is just merely an offhand impression.

Q. One-tenth of one per cent of what?

A. Aluminum phosphate.

Q. That is expressed as aluminum phosphate?

A. Yes.

Q. One-tenth of one per cent of the total dry material?

A. Yes. Of course, you understand I am answering that question merely from memory.

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Q. *We understand that is a rough expression?*

A. Yes, that was done perhaps a year ago.

Q. *Yes. What about the oat seed?*

A. I would say offhand it is about the same.

Q. *About the same. And beans? Is that the seed that you tested?*

A. Yes.

Q. *About how much did you find in that?*

A. I cannot tell you. It may be more and it may be less. I cannot tell you now, because it is work that was done, as I say, over a year ago. I cannot carry those figures in my mind, but it is small amounts in all of those materials, but when you ask me to study the figures, I cannot do it.

Q. *And the clover and alfalfa plants, the amounts were also small?*

A. Yes, but more.

TESTIMONY, WALTER D. RICHARDSON, Chief Chemist and Chemical Engineer, Swift & Co.

WALTER D. RICHARDSON was thereupon called as a witness, and having been duly sworn, testified as follows:

By MR. BROWNELL: Q. *What is your name?*

A. Walter D. Richardson.

Q. *Where do you live, Mr. Richardson?*

A. Chicago.

Q. *What is your occupation?*

A. I am Chief Chemist and Chemical Engineer for Swift & Company.

Q. *Would you give us a brief statement of your education, training and experience?*

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A. I took chemical courses in high school and followed them up with special courses in the University of Chicago. I entered the Chemical Laboratory of Swift & Company as Assistant Chemist, and since 1901 have been chief chemist, and chemical engineer with headquarters at Chicago and in charge of their various chemical laboratories and chemical work.

Q. *Are you a member of any profession or societies?*

A. I am a member of the American Chemical Society, the Association for the Advancement of Science, the American Electro-Chemical Society, the American Institute of Chemical Engineers. Those are the principal ones.

Q. *Has your work for the past several years been such as to involve research and reference to literature in your profession?*

A. Yes. I am in charge of the research laboratories of Swift & Company, as well as the laboratories in which routine work is handled, and both these lines of work require constant reference to chemical literature.

* * * * *

There are numerous analogies in chemical terminology between the use of alum in its restricted sense and its general sense and other words similarly used. Such, for example, as the following: The word "salt" unqualified signifies common salt or sodium chloride. But in its general sense it denotes a large group of chemical substances composed of a metallic or other base, and an acid radicle.

The word "alcohol" unqualified means common alcohol or grain alcohol, ethyl alcohol, but whereas in its general sense it signifies a group of organic substances containing the hydroxyl radicle.

Sugar, without qualification, means cane sugar or succose. In its general sense, it covers a considerable group of organic substances, of sweetish taste, belonging to the carbohydrates, of which cane sugar is but one member.

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Ether means common ether, or ethyl ether, but in a general sense the ethers are a large organic group, the oxides of organic radicles.

Aldehyde, unqualified, means ethylaldehyde, but in a general sense it refers to the group of aldehydes—organic substances, characteristic or characterized by the CHO group.

Other examples of a similar kind might be given, but the above indicates the general trend of chemical usage.

Sodium aluminum sulphate is a salt used in baking powder manufacture, and commonly known by that term in the trade, or in brief, as SAS. This substance is commonly named, the name indicating its chemical composition, and no confusion can result from the use of such a name. SODIUM ALUMINUM SULPHATE IS NOT, PROPERLY SPEAKING, EITHER ALUM OR AN ALUM. If it were in crystalline form with 24 molecules of water, it could properly be called a member of the alum group, or sodium alum, but since it contains no water of crystallization, and thus does not possess either the chemical structure or crystalline form characteristic of the alum group, it would be incorrect to call it either alum or an alum.

* * * * *

My conclusion may be summed up as follows:

The Latin word "alumen" from which the modern word "alum" is derived, denotes astringent brines and substances containing or composed of aluminum sulphate, iron sulphate, electrolyte salts, and also alum in the sense of potassium alum.

In late Roman times, and during the middle ages, the word "alumen" signified a purified and crystalline product made from such mineral crude materials and still later from the mineral alunite. The same meanings may have attached to the English word "alum" during its early history, but in all likelihood it was applied more and more to potash alum and sometimes to ammonium alum as well.

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After the middle ages, and down to the present time, potash alum has been on the whole the principal member of the alum group, although at times ammonium alum has had extensive use. Both have been called alum, common alum, ordinary alum, in numerous works of reference, but the term "alum" unqualified has been more frequently applied to potassium alum than to ammonium alum.

In modern times, and in particular during the past fifty years, potash alum has been the common alum of commerce, with the exception of short periods such as during the late war, when potash was scarce and ammonium comparatively plentiful.

In the great majority of modern chemical textbooks and other works of reference, including standard and medical dictionaries, the word "alum" unqualified means potassium alum. The term "alum" has been extended in a technical sense by chemists to include the entire group of alums, which are compounds of the same crystalline form as common alum and of analogous chemical structure.

In this group of alums, the potassium may be replaced by another metal or base, and the aluminum by other metals, either such as chromium or iron.

Aluminum sulphate has come into increasing use in recent years for water purification, tanning, paper-making, and so forth, as a substitute for alum, and in jargon and shop talk, it has frequently been called alum. This misuse of the word alum covers aluminum sulphate, and has resulted in a confusion of terms, but the practice has never become general, and indeed, the majority of persons using the word "alum" in place of aluminum sulphate, are well acquainted with the fact that they are using an incorrect word.

Sodium aluminum sulphate—SAS—as used in the baking-powder industry, can not be considered alum or an alum. It is properly and correctly designated as a sulphate.

The present definition of alum as given in Webster's New International Dictionary, is correct and satisfactory. Alum and aluminum sulphate are defined as follows:

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- A. My present occupation is scientific research in the applications of chemistry and biology in medicine and the arts.
- Q. *In your research work have you had any occasion to inquire into the properties of baking powder?*
- A. I have given special attention to the subject of baking powders during the past 25 years.
- Q. *What are generally the ingredients of baking powders?*
- A. In answering that, I might first state that prior to the use of baking powders, it was customary in cooking to employ a combination of baking soda and an acid, usually sour milk, for the purpose of liberating the carbon dioxide gas from the baking soda and thus serving to raise the food in which this combination was used.

Baking powders are more or less a combination of an acid ingredient with sodium bicarbonate or baking soda to accomplish the same result. There is usually present in most baking powders baking soda or sodium bicarbonate; there is an acid ingredient, the nature of which varies with the type of baking powder; and there is some form of filler used which is commonly starch.

The baking powder is so combined that the amount of acid necessary to react with the amount of baking soda present is in the correct proportion, and in that way baking powder is supposed to have an advantage over the rather haphazard method of combining baking soda with sour milk where the direct proportions are not known.

- Q. *What are the acid ingredients in baking powders?*
- A. The acid ingredient in baking powders varies with and determines the type of the baking powder. In the so-called tartar baking powders, the acid ingredients are bicarbonate of potash, frequently combined with some tartaric acid as the acid ingredients.

In the phosphate powders the acid calcium phosphate is commonly used, although the acid sodium phosphate has been used and possibly is used at the present time.

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In the class of powders containing aluminum salts, the ingredients are a mixture of sodium and aluminum sulphate, which is known in the trade as "SAS." While it is not an acid, the action is acid with sodium bicarbonate liberates the CO_2 .

In each of these types, in addition to the baking powder and the acid ingredient, there is present a filler, and that is commonly starch.

Q. *That filler serves what purpose?*

A. To prevent the inter-action of the baking soda with the acid ingredients until moisture has been added.

Q. *You used the abbreviation "SAS." Will you state, please, exactly what that means?*

A. SAS is a name applied to a mixture of sodium sulphate and aluminum sulphate.

Q. *Is SAS alum?*

A. It is not.

Q. *What is alum?*

A. Alum is the potassium sulphate combined with aluminum sulphate in molecular proportion together with water of crystallization; twenty-four molecules of water crystallization.

Q. *Is this the only substance which is alum?*

A. It is the only substance which is commonly known as alum.

* * * * *

Q. *As I understand you, Doctor, you have never found a baking powder made with burnt alum as its acid ingredient?*

A. No, I never have.

Q. *Have you ever found a baking powder made with alum as its acid ingredient?*

A. No, I have not.

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Q. *Have you ever purchased alum at a drug store?*

A. I have.

Q. *What did you ask for?*

A. Alum.

Q. *What did you get?*

A. Alum.

Q. *What do you mean?*

A. Potash alum.

Q. *Is soda alum on sale in the drug stores?*

A. It is not.

Q. *Is sodium aluminum sulphate, SAS, on sale in the drug stores?*

A. It is not.

Q. *In your opinion, Doctor, is it correct to say that baking powders which have SAS as an acid ingredient are made of alum?*

A. It is not.

* * * * *

Q. *And, having completed these experiments, which you have described, you reported to the Association that this kind of baking powder was, in your opinion, healthful?*

A. That was my conclusion, as a result of all the experiments that I conducted, that the body did not retain aluminum; it was not stored in the body; that it was not the source of any injury to the body.

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- Q. *Were you joined in that report by your associates whom you mentioned this morning?*
- A. Dr. Austin Flint and Dr. Peter T. Austin both coincided and signed the report to that effect to the association.
- Q. *Did you conclude your connection with the matter at that time?*
- A. That concluded my connection with the matter at that time.
- Q. *Did you know of the Referee Board report?*
- A. Yes. I was not acquainted with the fact that they were conducting such investigations until just at the time when their report came out, although I am known to the members of the Board, and they knew me personally and I know them personally. I was not acquainted with the fact that this work was going on and how much they had seen of my work, I do not know. This has never been published in scientific literature, but has been published in open reports in the Baking Power Controversy already referred to, and, whether it came to their knowledge or not, I do not know.
- Q. *How did the Referee Board Report compare with your opinion which you had already had from your experiments concerning the healthfulness of so-called alum baking powder?*
- A. The Referee Board's report agreed with mine in substantially every part and verified and strengthened the opinion, if it need be, which I had already expressed.
-

TESTIMONY, MATTHEW STEEL

MATTHEW STEEL was thereupon called as a witness, and having been duly sworn, testified as follows:

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DIRECT EXAMINATION

BY MR. COX: Q. *Where do you reside?*

A. 14 Hilton Avenue, Hempstead, Long Island.

Q. *What is your calling?*

A. Professor of Biological Chemistry at Long Island College Hospital, Brooklyn, New York

Q. *What training and experience have you had in connection with biological chemistry?*

A. I received the degree of Bachelor of Science for which I specialized in chemistry and physics at the New Mexico, N. M. College in 1901. I received the degree of Master of Science in which I specialized on those same subjects in 1902. I was Assistant Chemist of the New Mexico Experiment Station, 1902, to February, 1904; February, 1904, to November, 1904, I was Scientific Aid in the United States Department of Agriculture located in Washington.

Beginning in November, 1904, and through to June, 1905, I was the Assistant Chemist of the Rhode Island Experiment Station, Kingston, Rhode Island. From 1905 to 1908 I was soil expert in cooperative work between the United States Bureau of Soils and the Rhode Island Experimental Station also located at Kingston, Rhode Island. That is where our principal branch was located.

From 1906 to 1908 I was graduate student in Columbia University, receiving the degree of Ph. D. in 1908. From 1908 to 1910 I was instructor in the Columbia University.

Q. *On what subject?*

A. Biological chemistry.

From 1910 to 1911 I was expert in biochemical researches in cooperative work between the United States Government and the University of Missouri, performing experiments on cattle and—of every type, and experiments of a similar nature.

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From 1911 to 1912 I was Assistant Professor in Biological Chemistry in the University of Missouri. Since 1912 I have been connected with the Long Island College Hospital. I have been head of the department since 1916.

Q. *Did you at the same time, Doctor, make certain researches or perform certain experiments in connection with aluminum?*

A. Yes, sir, I did.

* * * * *

These experiments were conducted fourteen years ago, and I have not the original records here. I have moved around so many times—the original records beside this published paper are lost and I cannot dig them up for you.

Q. *This figure which you have given of .9644 grams was the actual weight of the residue.*

A. Yes, sir.

Q. *Containing both aluminum phosphate and iron phosphate?*

A. The actual weight of the phosphate precipitated of iron and aluminum—the actual weight.

Q. *These other figures you have given, especially that of aluminum phosphate are .0032 grams; that was not an actual weight?*

A. It was not an actual weight.

Q. *That was the difference between what iron you calculated was in this residue and the total weight of the residue?*

A. Yes, sir.

Q. *Would you mind repeating for the record just that explanation you were giving the Examiner about the difficulty of separation?*

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- A. The difficulties in separation of iron and aluminum phosphate are due to the similarities in the properties of iron and aluminum, and the impracticability of precipitating either the iron or the aluminum from that solution and leaving behind the other elements. That is, one cannot precipitate the iron and leave the aluminum behind without a great deal of difficulty. I do not say that it is impossible to do that, that it is very difficult to do it. It is necessary to add certain re-agents that would render your iron soluble and then to add some other re-agent that would not precipitate that iron, but would precipitate the aluminum.
-

TESTIMONY, W. E. STOKES, Chief Chemist, Royal Baking Powder Company

- Q. *Getting back to what we started with, in your opinion as a chemist, then, as I understand you, your opinion is that this substance which I buy in the drug store is not the same as the substance which I find as an acid ingredient in baking powder?*
- A. No, it is not.
- Q. *Can you have an aluminum compound that is not an alum?*
- A. Oh, yes.

* * * * *

- Q. *Is there any baking powder to your knowledge, on the market today, that has mixed in it the same substance that I could buy in the drug store when I ask for alum?*
- A. No, not so far as I know.
- Q. *Do you know of any baking powder that has aluminum sulphate alone mixed in it as an acid ingredient?*
- A. No.

SWORN TESTIMONY

- Q. *Why do they not use aluminum sulphate by itself as an acid ingredient?*
- A. I suppose because of the very great solubility of aluminum sulphate.
- Q. *It would be impracticable as a business proposition to use it?*
- A. It would have poor keeping qualities.
-

TESTIMONY, JOHN TEEPLE

JOHN TEEPLE was called as a witness and having been duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. REIGHARD: Q. *State your name please?*

A. John Teeple.

Q. *Where do you live, Doctor?*

A. Do you want my home or my office, or what?

Q. *Your residence.*

A. Montclair, New Jersey.

Q. *What is your present occupation?*

A. Chemical adviser.

Q. *Where is your office.*

A. 51 East 41st Street, New York.

Q. *Will you please tell us briefly what has been your education, training and experience.*

A. Why, my chemical education was obtained largely at Cornell University, where I took my doctor's degree. I served as an assistant instructor there for five years, in organic and physiological chemistry.

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Since 1904 I have been in New York mainly as a consulting chemist, and chemical engineer in connection with the manufacture of products, either chemicals or related to chemicals.

Q. *With what companies have you been connected?*

A. Off the record, Mr. Commissioner, is it all right for me to find out just what he wants to ask me?

EXAMINER AVERILL: Yes, because if you do not know what character of clients he means——

MR. REIGHARD: Oh, no. I think he has given me a list here of different ones. Chief Chemist of a certain company and chemist of another company. There are two or three names there.

THE WITNESS: Oh, I see. Ones that might have a bearing on this case.

Q. *That is what I was referring to, what you wrote out here for me?*

A. For two years I was Chief Chemist of J. T. Baker Chemical Company.

Q. *What did they do?*

A. From 1904 to 1906. The manufacture of high grade and chemically pure chemicals.

For four years, from 1904 to 1908, I was chemical director of the Charles E. Scholes Company, a southern company who market alums of various grades, and for three years, from 1918 to 1921, I was chemical adviser to the Niagara Alkali Company who manufacture caustic potash, caustic soda and potassium permanganate, sodium permanganate and similar products.

For five years, 1919 to 1924, I have been responsible for all the operations of the American Trona Corporation who manufacture potassium chloride and sodium tetraborate from the same borates. And for the last twenty years I

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have been a consulting chemist, frequently called in on problems of potash soda and such things.

* * * * *

Q. *You were employed by the Royal Company to develop this information that you have given us, Doctor?*

A. Yes.

Q. *How long ago?*

A. Off the record, I do not know whether I can tell you exactly.

Q. *Well, just approximately, this year or last year?*

A. Oh, I think it was in April of this year.

Q. *And in preparing to give this testimony, you analyzed, you say, two brands of baking powder, the Davis and the Triumph?*

A. I tested them for the presence of potassium, had them tested under my direction.

Q. *Just those two brands?*

A. So far as I know, those were the only two, so far as I recall now.

Q. *And your tests were merely qualitative?*

A. On the baking powder.

Q. *Did you give any particular reason for taking those two brands and ignoring the others on the market?*

A. No, the history is simply that I told one of my men to go out and pick up what he could find, and he visited a series of stores.

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BY MR. REIGHARD: Q. *You may refer to the fourth page of your notes on the analysis, near the top of the page.*

A. The fourth page. Oh, yes, he visited a series of stores in the neighborhood of our laboratory, covering about fifteen places where baking powder was sold, and these two brands, besides Royal, were all he happened to find.

BY MR. BROWNELL: Q. *Did he find some Royal?*

A. Yes.

Q. *Did you test that?*

A. Not at the present. But I know that it contains potassium.

Q. *Now the Davis Powder you found to be a mixed powder, didn't you, that is, mixed, containing both sodium and aluminum sulphate and phosphate?*

A. I was only interested at the moment in testing for potassium, and I tested for that only.

Q. *But didn't it occur to you, that if it was a mixed powder, there might be potassium phosphate there, in that?*

A. It did not occur to me that that was likely, after I had found the potash in SAS.

Q. *I see. You found potash in your tests and concluded that it was potash alum?*

A. I concluded that a part of it was likely to be potash alum, just from the nature of it, because it was in SAS.

Q. *And you found potassium in the Royal Powder also?*

A. I said I did not test the Royal, but I have no doubt it has potassium in it.

Q. *But in regard to these two powders, Davis and Triumph, you are not able to say absolutely, are you, Doctor, that the potassium you found was not potassium phosphate?*

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- A. That comes down merely to the question of what you mean by sureness, or absoluteness. To my mind there is no doubt whatever that that is what it is. And to my mind it could probably be checked by anybody who would want to determine and would find it there.

MR. REIGHARD: Will you read that to me, please?

(The last question and answer were repeated by the reporter as above recorded.)

THE WITNESS: Of course, what I meant there is, it is potash alum.

MR. REIGHARD: That it was potash alum, yes.

BY MR. BROWNELL: *Q. I believe you said in answer to a question by counsel that even if you did not regard SAS as an alum, still you would classify powders made with it as alum baking powders, because of the presence of potash alum?*

A. Yes, if there were one, I do not regard the SAS as alum.

Q. Now, if you found, for instance, that Royal Baking Powder did contain one-half of one per cent potash alum, would that be an alum baking powder?

A. Now, may I have him read that question to me? I did not quite get that.

(The last question was repeated by the reporter as above recorded.)

MR. REIGHARD: I think I want to object to that question as irrelevant and immaterial.

EXAMINER AVERILL: Objection overruled, gentlemen. Let us get the question.

(The last question was again repeated by the reporter as above recorded.)

MR. BROWNELL: Well, that is a clear question.

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- A. Here is the answer. If I were in a hair-splitting mood as to just what is alum or just what is an alum baking powder, I probably would call the Royal, under those circumstances, an alum baking powder.

BY MR. BROWNELL: Q. *The difficulty, if I understand you, arises from the process of manufacture of chemicals and keeping them pure, entirely, is that so? Then there would be a little potassium in a soda product and a little sodium in a potassium product?*

- A. Is that a question?

Q. *Yes. Is that so?*

- A. In commercial soda products there is nearly always potassium, and in commercial potassium products there is nearly always sodium. How much, depending on the previous history of the treatment.

Q. *But as a practical proposition the active ingredient, active acid ingredient in these powders is sodium aluminum sulphate, isn't it?*

- A. I have no reason to think it is any more active than the potassium aluminum sulphate is, but probably that is not your question.

Q. *Well, in a baking powder, I mean. You analyzed two samples of baking powder. Practically, is not the SAS the active acid ingredient?*

- A. I repeat that I do not see that it is any more active than the potash alum which is present. There is more of it.

Q. *Then if Royal Baking Powder contains a small percentage of potash alum, you would also describe that as an active acid ingredient of Royal Powder, would you?*

- A. As I say, if I were in a hair-splitting mood, where I was looking after these minor differences, all the way down the line, I probably would regard it as active. But that is not usually my mood on the whole thing.

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Q. *Then you are hair-splitting when it comes down to scientific accuracy, aren't you?*

A. You mean in this case?

Q. *In every case where you analyze carefully?*

A. Frankly, I am not, when I analyze, no.

Q. *In other words you are hair-splitting when it comes to alum powders, but not when it comes to Royal, is that correct?*

A. It is not correct.

Q. *Then if it is important to regard very small percentages of potash alum in alum powders, isn't it just as important to regard that potash alum in Royal Baking Powder?*

A. Just as important in one case as it is in the other case.

MR. BROWNELL: *Yes, precisely. That is all.*

TESTIMONY, ERNEST W. THORNTON

ERNEST W. THORNTON was thereupon called as a witness, and having been duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. BROWNELL: Q. *What is your position, Mr. Thornton?*

A. I am chief chemist for R. B. Davis Company.

Q. *Where is their plant located?*

A. Hoboken.

Q. *What is their business?*

A. Baking powder.

Q. *They manufacture it?*

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A. Manufacture it.

Q. *How long have you been with that company?*

A. A little over five years.

Q. *Where were you educated in your profession?*

A. I took my Bachelor's degree at the State Agriculture of the Chemical College of Alabama, better known as Alabama Polytechnic, and some graduate work at the University of Michigan, and my Master's degree at the Alabama Polytechnic in 1910.

Q. *Have you been engaged elsewhere than at the R. B. Davis plant in your profession?*

A. I have. I was in the teaching staff and assistant in the State Laboratory at Albin, where the Alabama Polytechnic Institute is situated, until January, 1910.

From January, 1910, until September, 1918, I was with the State Agricultural Department in North Carolina as Assistant Chemist, First Assistant State Food and Oil Chemist, and Acting State Food and Oil Chemist for the last couple of months, I believe, that I was connected with the Agricultural Department.

From that time I have been with the R. B. Davis Company.

* * * * *

Q. *Is there, in the baking powder made by your company, any aluminum compound?*

A. There is.

Q. *What is that material?*

A. Sodium aluminum sulphate, known as SAS.

Q. *Let us see; as I understand you, SAS is an abbreviation?*

A. An abbreviation for sodium aluminum sulphate.

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Q. *Well, what is SAS?*

A. It is a mixture of the sulphates of sodium and aluminum.

Q. *Is this material alum?*

A. No.

* * * * *

BY MR. BROWNELL: Q. *There is one other point, Mr. Thornton, I neglected to ask you on direct examination. Is it, in your opinion, unusual to take one member, as you have testified, out of a general class of substances and call that alum, whereas the whole class is the alums?*

A. No, that is not unusual at all.

Q. *You heard the preceding witness, didn't you, give examples as to sugar and salt?*

A. Yes, and I thought of another instance that is in common use, alcohols. If you go into a drug store and ask for alcohol, you will get grain alcohol, ethyl alcohol. Now, there are a dozen other different kinds of alcohol, but that is the only kind of alcohol you will get.

There is wood alcohol, which is very different, and you never would be given wood alcohol unless you were very unlucky.

Q. *Then in naming one of the substances as alum out of a whole class of substances known as the alums you are doing the same thing in your opinion as——*

A. Absolutely, as if you went into a grocery store and asked for salt you would get sodium chloride. You would not get one of a thousand other different materials that are classified as salts.

MR. BROWNELL: That is all.

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RE CROSS EXAMINATION

BY MR. COX: Q. *When you were speaking of never having heard alum applied to SAS, or alum baking powder to baking powder containing the SAS ingredient; did you have anything to do with baking powders when you were connected to the State Department of North Carolina?*

A. Yes, I had to do with the collection and examination of samples.

Q. *And you never heard of alum baking powder in that connection?*

A. No, I do not think that I ever heard it expressed as alum baking powder.

TESTIMONY, MISS OLIVE G. VINCENT

MISS OLIVE G. VINCENT was called as a witness, and having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. BROWNELL: Q. *Where do you reside?*

A. Ashland, Virginia.

Q. *Have you ever been employed by the Southern Manufacturing Company?*

A. Yes, sir.

Q. *In what capacity?*

A. Stenographer and general clerk—order clerk and different office work.

Q. *When did you begin your work with the company, and when did you terminate it?*

A. I commenced September 1, 1900, terminated August 1st, 1919.

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Q. *What was the nature of the work that you did?*

A. I was employed first strictly as a stenographer, but that work was not very heavy at that time, and I got to doing other work, and I handled all orders, or the invoicing. I was there several years, so I handled the railroad claims, filed correspondence, opened and stamped the mail, answered some letters myself. I have done some work in the purchasing office. In fact I worked in everything except the advertising. I cannot say that I had much connection with that.

Q. *You were there during Mr. Leigh's presidency?*

A. Yes, sir, all through his presidency.

Q. *And during that time were you stenographer?*

A. Yes, sir. I took most of Mr. Leigh's dictation at that time. I mean, all kinds of dictation.

Q. *Now, during this time—I mean during Mr. Leigh's presidency—did you have occasion to write letters to those whom you understood to be officials of the Royal Baking Powder Company?*

MR. REIGHARD: Just a moment. Do I understand that my objection to the other witness applies as well to this one?

EXAMINER AVERILL: I think you had better state to what you wish it to apply. That particular question, of course, you might have another objection to besides.

MR. REIGHARD: Yes. Well, I want to object generally to the testimony of this witness on the grounds stated in my objection to the testimony of the previous witness.

EXAMINER AVERILL: The general objection is overruled and the exception is noted by counsel.

MR. REIGHARD: And I object particularly to the question as asked on the ground that it calls for a conclusion of the witness.

EXAMINER AVERILL: I think the question should be just a little changed in its phraseology, and ask if she wrote letters to the officials of the Royal Baking Powder Company, and she can

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answer that. I think you had better ask it that way, and then it will show up from her subsequent answers why she thought it was officers of the Royal Baking Powder Company.

BY MR. BROWNELL: Q. *Did you at this time—that is, during Mr. Leigh's presidency—write letters to officials of the Royal Baking Powder Company?*

A. Yes, I will say I did.

Q. *Do you remember some of the names?*

A. W. L. Gary, John E. Rose, John Morris, W. R. Peters, Sumner W. White, Prof. McNurtrie, and possibly Mr. William Champ.

Q. *Did you write many such letters?*

A. No. The correspondence was not—it was not very much, rather.

Q. *Were the letters in answer to former letters from these people?*

A. Yes, sir.

Q. *Did you use the regular letterhead of the Southern Manufacturing Company?*

A. No, sir.

Q. *The Southern Manufacturing Company did have a regular letterhead which they used in their ordinary correspondence, didn't they?*

A. The Southern Manufacturing Company had two letterheads that they used, one being perfectly plain, which did not show the nature of its business; that is, had only the address, the name Southern Manufacturing Company and Post Office, Richmond, Virginia, and the one with the can, regular advertising.

Q. *And which one was generally used in ordinary business transactions?*

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A. Well, Mr. Leigh, in dealing with a customer or any personal letter, he would use the one with just the name and address. It was much finer paper. The other was rather showy, with a can on it.

Q. *Which did you use with reference to these individuals?*

A. Plain paper.

BY EXAMINER AVERILL: Q. *Do you mean by "plain" just the paper with the Southern Manufacturing Company's name?*

A. No.

Q. *Such as you have described, or do you mean an absolutely plain paper?*

A. I mean an absolutely plain piece of paper.

BY MR. BROWNELL: Q. *So that you used neither of the ordinary letterheads?*

A. No, sir. I did not.

Q. *How were these letters addressed?*

A. "Dear Sir."

Q. *And not mentioning any name in the letter?*

A. No, sir.

Q. *I think you have told us, but I ask you again, was that the usual way in which letters were written to others from your company?*

A. Well, in "others" whom do you mean?

Q. *I mean other companies or individuals beside the Royal Baking Powder Company.*

MR. REIGHARD: I object to that as it is clearly incompetent.

MR. BROWNELL: It is clearly competent as showing an unusual style of addressing the company.

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EXAMINER AVERILL: I do not understand that these letters were addressed to a company. It is the witness' testimony that they were sent to or intended for the individuals or some one of the individuals whom she has mentioned. Now, it brings in another phase—I mean, if that is intended to be brought in, this testimony of the witness that she wrote to some particular company on that paper.

MR. BROWNELL: No perhaps my question is poorly framed. All I am asking is this:

Q. *Was that method of address in the preparation of letters the same method used in the ordinary business correspondence?*

A. It was used only in addressing these people.

Q. *What in general did the letters which you wrote deal with, as to the company policies and business? I mean, the letters which you wrote to these individuals, or were they simply replies to the letters which you had received from the individuals?*

A. They were replies to the letters we had received from them asking specific information and answering anything that they might have asked. It was not a voluntary correspondence suggesting things.

Q. *I think I had better ask you, Miss Vincent, why did you use a particular kind of plain paper and this particular style of address in these letters to the individuals whom you have named?*

A. Well, the paper was there, and we were told to use it, and it was understood that it had been requested that the correspondence go that way, on plain paper.

Q. *And of course, in the body of the letter, so far as you were concerned, was dictated by the different officials of your company?*

A. It was dictated—well, while Mr. Leigh was president the correspondence was with him. The correspondence always came to whoever was president.

SWORN TESTIMONY

MR. BROWNELL: You may cross examine.

CROSS EXAMINATION

BY MR. REIGHARD: Q. *Miss Vincent, do you know what connection this Mr. White that you refer to had with the Royal Baking Powder Company?*

A. He was a member of the firm of Peters, White & Company, chemical brokers, I think. I do not know what connection he had in the Royal.

Q. *So far as you know, then he was not an official of the Royal Baking Powder Company?*

A. I have no knowledge that he was.

Q. *Well, Mr. Champ, was he an official of the Royal Baking Powder Company?*

A. Well, he was—after Mr. Ziegler died he was one of the executors, or whatever you call it.

Q. *One of the trustees under the will of Mr. Ziegler?*

A. Yes, one of the trustees.

MR. REIGHARD: That is all.

(Witness excused.)

TESTIMONY, DR. HARVEY E. WILEY

HARVEY E. WILEY was thereupon called as a witness, and having been duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. COX: Q. *Dr. Wiley, where do you reside?*

A. In Washington.

Q. *And what is your present occupation?*

A. I am connected with the Good Housekeeping Magazine next door here, and editor of one of the bureaus, director, and I

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do a bit of lecturing and writing of different kinds; and I am a farmer.

That is my principal occupation, trying to pay taxes.

Q. *And the subject with which your department of Good Housekeeping, and also your lectures are particularly concerned, is foods, is it?*

A. Well, foods, sanitation and health. That is the name of my bureau, and my lecturing is mostly along lines of that kind.

Q. *Will you tell us a little of your training and something of your experience in connection with those subjects generally, and particularly with relation to baking powders.*

A. Well, my training has been largely along the chemical line. I didn't start out as to be a chemist and I never succeeded in being one very much, but I was led into the study of chemistry in my study of medicine.

* * * * *

I got an early prejudice, I might say, against alum in my home surroundings. My mother would never use any baking powder of any kind that contained alum, and when I asked her why, or when she told me, she said she didn't think it was wholesome good for the children.

That prejudice ripened later into a conviction, and especially after I finished my tour with Senator Mason. There I heard testimony of all kinds in regard to all kinds of adulterations. Many experts were in evidence who thought that alum baking powder was as good as any other; a less numerous number, and among others two very eminent chemists of my acquaintance, mainly Prof. Mallett of the University of Virginia, and Prof. Albert V. Prescott of the University of Michigan, were strongly opposed to the use of alum in baking powders. But I think that upon the whole that there were more persons that favored its use than there were who opposed its use. So if I had nothing to guide me but the opinions of eminent scientific men, I should have

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been gravely in doubt as to what position I would take in the matter.

But after hearing all of this testimony, without ever having made any experiments with alum myself, I was strongly convinced that it was not a suitable substance to use.

The protagonists of alum claim that it was practically insoluble in the form in which it reached the stomach, and, therefore, even if soluble alum were harmful, this insoluble alum would not be harmful.

Of course, there is a good basis of opinion on that point.

* * * * *

It remained for other investigators, however, whether alum found its way into the blood.

Alum was regarded as the type of non-soluble substances, almost, in the human organism. The Referee Board of Consulting Scientific Experts attacked that problem and they reported that in the feeding of alum in any form to the human animal, that it was never found in the blood.

* * * * *

I wanted my own knowledge to guide me, not what other people had said as in the case of alum and saccharine, I took other people's word for those. I never made any experiments with either one of those, but I put them both on the banned list when the food law was passed.

* * * * *

By the time this law was ready to be enforced, the opposition to me personally, because of my published findings in these matters was very bitter and very persistent, and it increased with every day that I tried under my oath to enforce the law, which I had sworn to do.

That was the occasion for the appointment of a Referee Board to which I have just referred, and who were assigned

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in all the matters that I had put under ban on telling information. Not only were they authorized and directed to review my work, on benzoate of soda and sulphur dioxide and sulphate of copper, all of which I had condemned, but also they were wanted to investigate alum baking powders and saccharine, two of my banned pets which I had never experimented with.

* * * * *

Now, as to the question of alum, I brought the Referee Board here (indicating), because it approves the use of alum, actually approved it, and I don't blame any alum baking powder company for standing pat on that proposition.

That is, here, eminent chemists, much more so than I, they did not seem to have the same spirit toward the protection of the public that I have always tried to manifest, and I don't think they covered themselves with any great glory by their decisions.

* * * * *

Now, I want to say a word about some statements I made years ago in regard to baking powder, and I don't deny that I made them. I did. I understood that the alum used for baking powder was not the alum sold in the drug store, but that it was a compound made with aluminum sulphate. I didn't know the technique of its manufacture. I assumed that it contained only one base, namely aluminum. My idea of alum used in baking powders was that it was a compound of sulphate in which a part of the original base is hydrogen. I call hydrogen basic because of the formula H_2SO_4 .

I did not know when I made that statement that the formula of alum used in baking powders is NaAl , and it has both sodium and aluminum as a base. So I said it was not an acid, it was not an alum, and that is true in the sense of the word that we formerly understood alum to be.

SWORN TESTIMONY

TESTIMONY, PAUL F. ZIEGLER

PAUL F. ZIEGLER was called as a witness and testified as follows:

DIRECT EXAMINATION

BY MR. BROWNELL: Q. *Give your full name to the reporter?*

A. Paul F. Ziegler.

Q. *Where do you live, Mr. Ziegler?*

A. Evanston, Illinois.

Q. *What is your business?*

A. Chemist for the Calumet Baking Powder Company.

Q. *How long have you been so employed?* ..

A. For two and one-half months—since September 1st.

Q. *Will you give us a brief statement of your training and experience?*

A. I studied three years at the Franklin-Marshall College. Took my B. S. degree from the Northwestern University and returned to the University the following year, to take a Master of Science degree. That was in 1921. The following year I studied at the University of Chicago in graduate chemistry work. I was nine months in the chemical warfare service, working on research problems with the gas, Lewisite, with the discoverer, Dr. W. Lee Lewis. I spent one year in the chemistry laboratories of Mayo Brothers at Rochester, Minnesota, in research work. From there I went into industrial chemistry, and for two years was plant superintendent and Assistant Production Manager of the Tablet & Ticket Co. of Chicago. This latter position was just previous to my connection with the Calumet Baking Powder Company.

Q. *Have you done any instructing during that time?*

A. I was instructor in the laboratory course of general chemistry at Northwestern University during my graduate work there.

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Q. *Your duties in your present positions are those of a commercial chemist.*

A. Commercial chemist.

* * * * *

Q. *Now, as a result of the work that you have done, and the experiments which you have described, what conclusions did you reach?*

A. Well, first of all, in order to check my own methods of neutralizing further, I took this boiled up sample of SAS and sodium bicarbonate, in which theoretical quantities were present, and filtered it, filtered the precipitate off. The filtrate was clear, and that I tested for soluble aluminum. There was none present. Two grams of baking powder, of Calumet Baking Powder, were boiled up and allowed to react completely. This solution likewise was filtered, and the filtrate tested for aluminum which would be, of course, soluble aluminum. There was none present.

